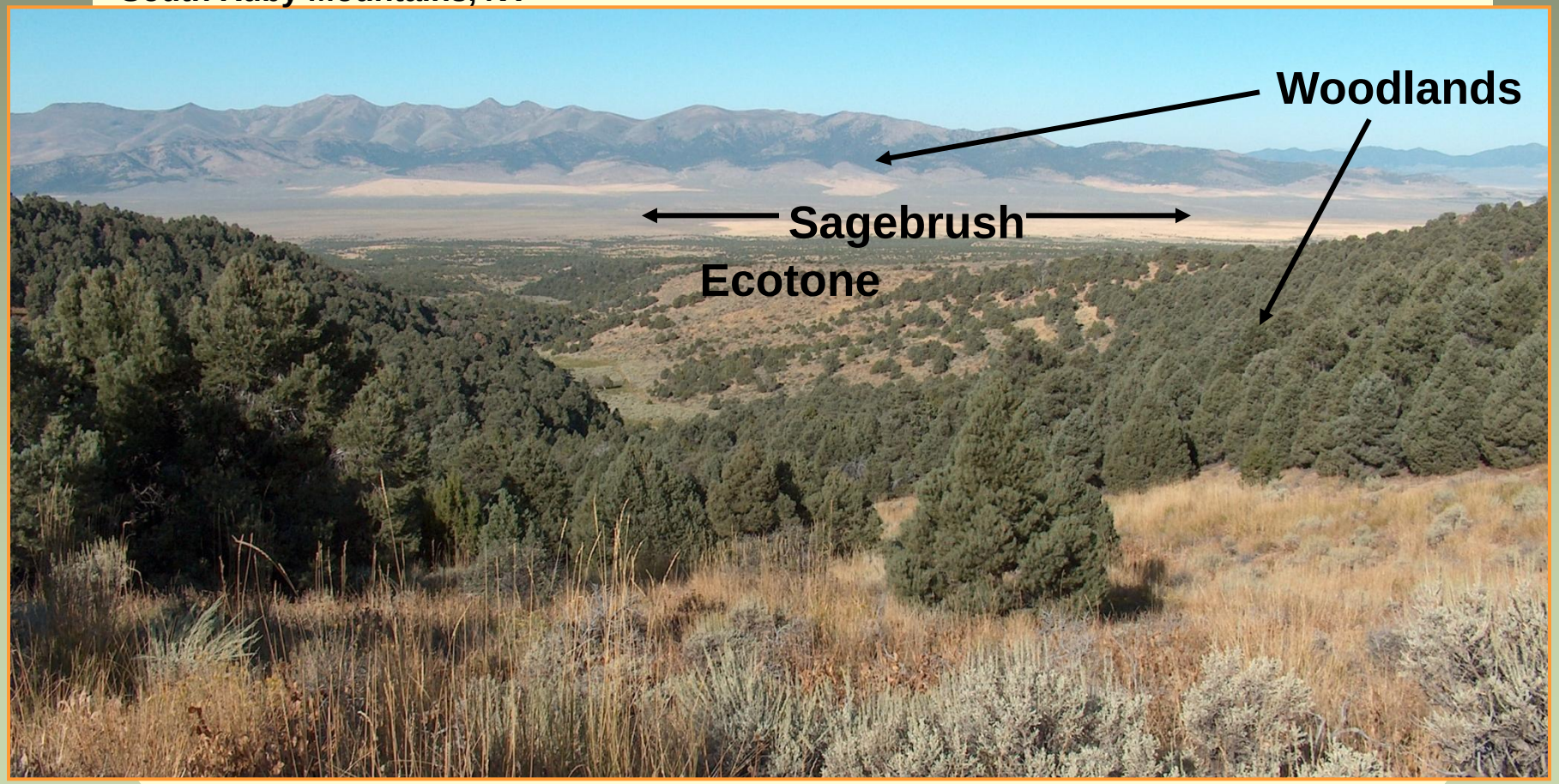
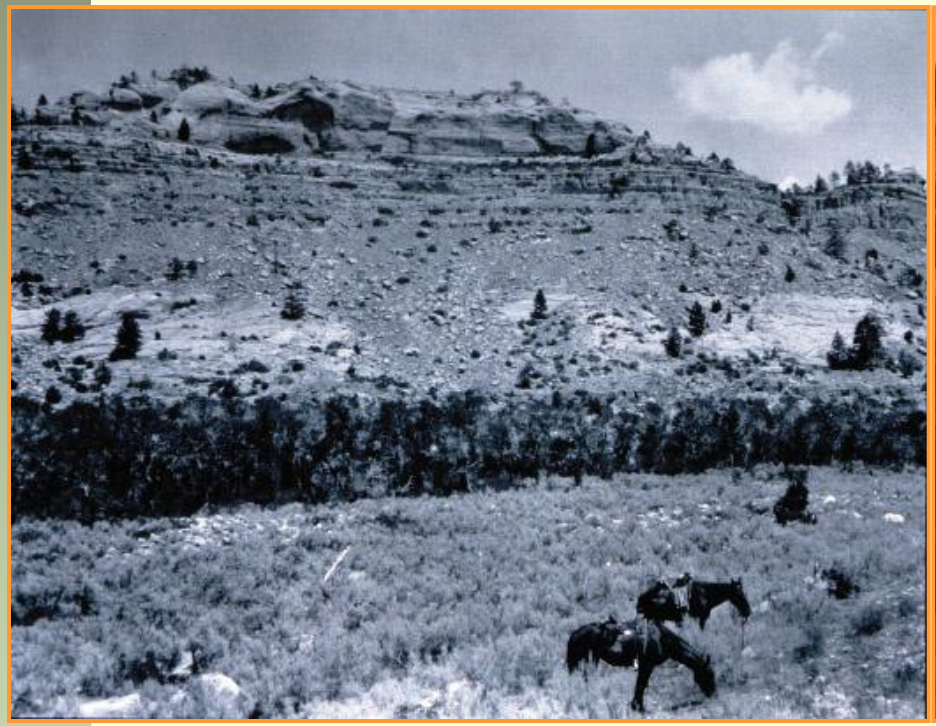
South Ruby Mountains, NV



USGS

Woodland Invasion
(expansion, encroachment, reclamation)



1904

1998

USGS

Sagebrush Ecotone Woodland

Time

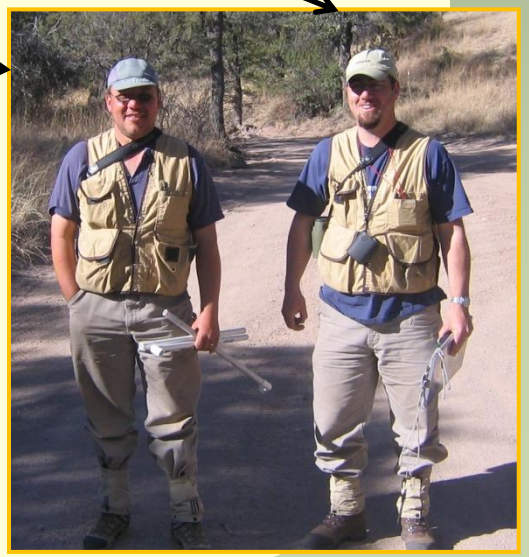
Management

Bird Community

Are we getting what we expect?
Short-term response by bird communities to treatments in pinyon-juniper woodlands

Steve Knick and Steve Hanser
USGS

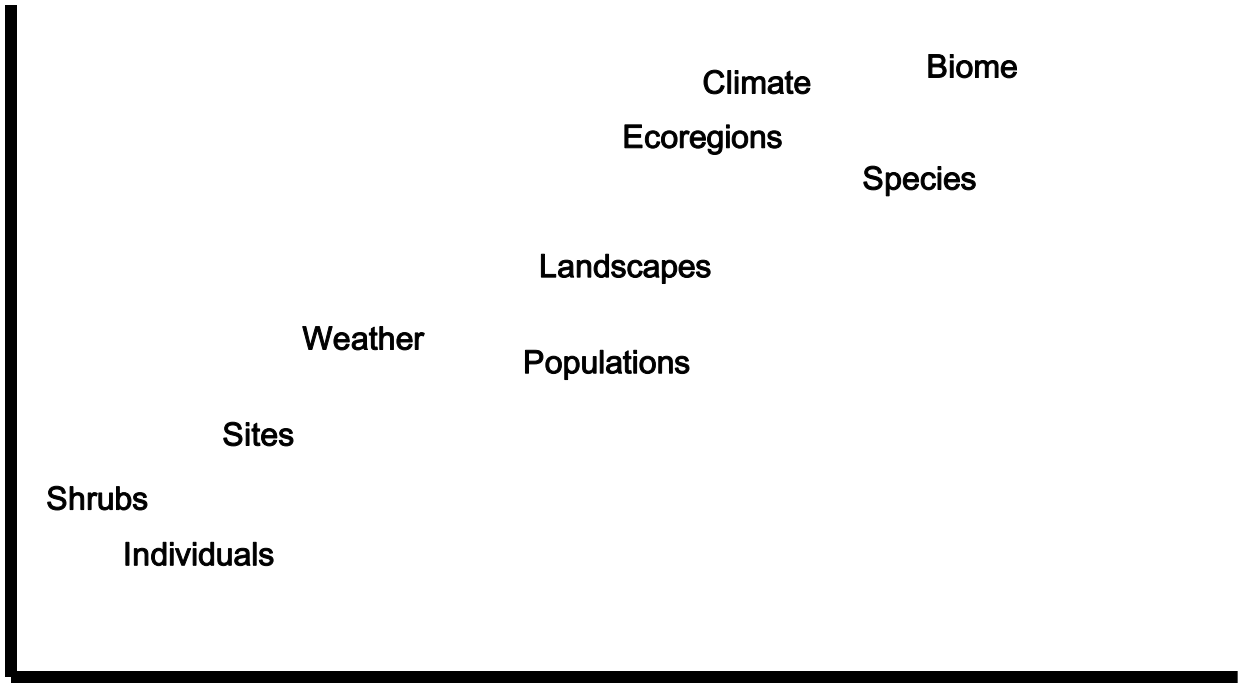
Matthias Leu
College of William and Mary



USGS Disclaimer: Results presented are preliminary and have not been peer-reviewed

USGS

Space – Time Relationships



So, Nat'ralists observe, a Flea
Hath smaller Fleas that on him prey,
And these have smaller Fleas to bit 'em,
And so proceed ad infinitum.

Jonathan Swift 1733

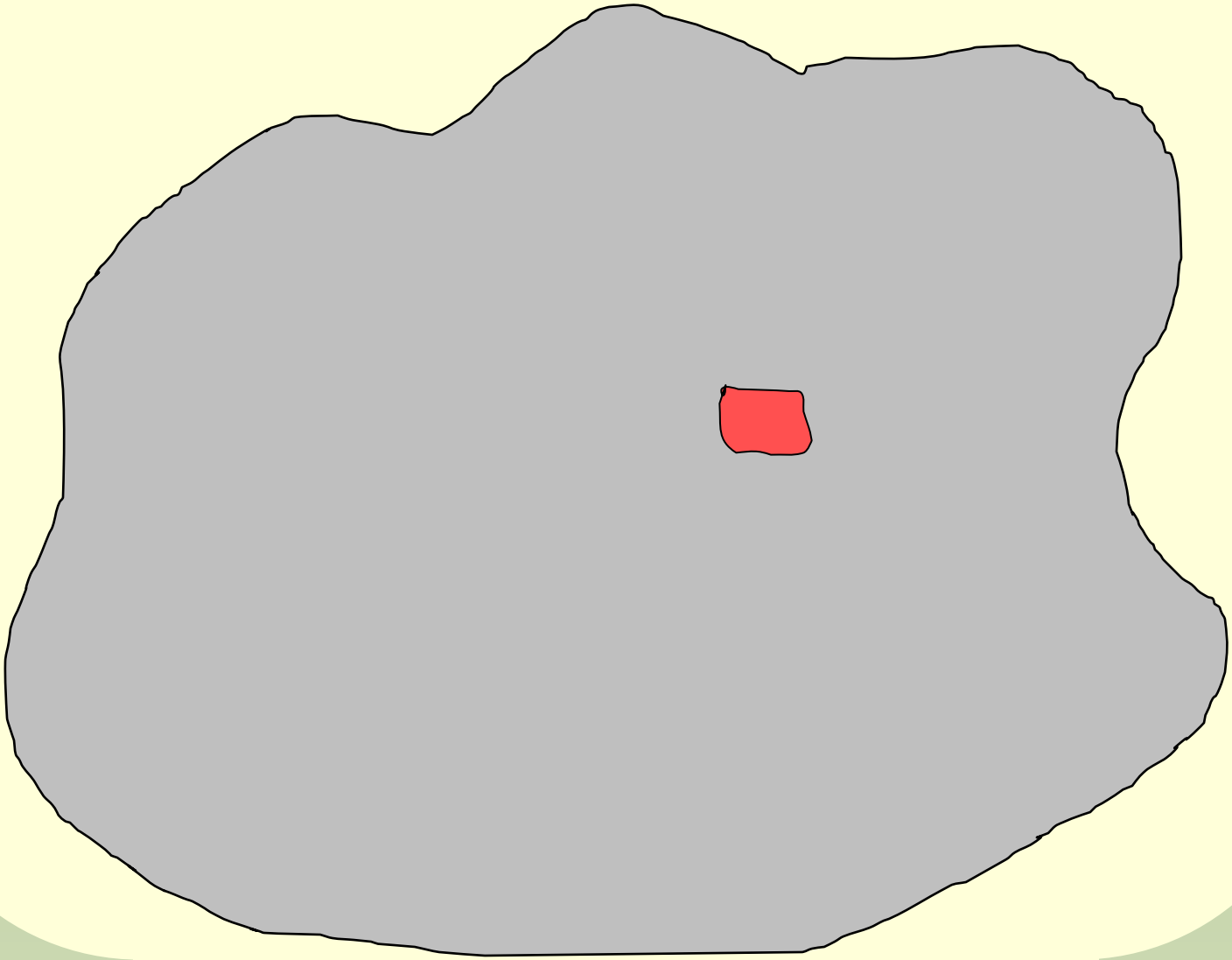
USGS

Greater Sage-Grouse
The Problems

- Large home range
- Long lived
- Low reproductive rate

USGS

Spatial scale – Disturbance/territory



USGS

Brewer's Sparrow

Black-throated Sparrow

Gray Flycatcher

Grasshopper Sparrow

Green-tailed Towhee

Horned Lark

Lark Sparrow

Loggerhead Shrike

Sage Sparrow

Sage Thrasher

Savannah Sparrow

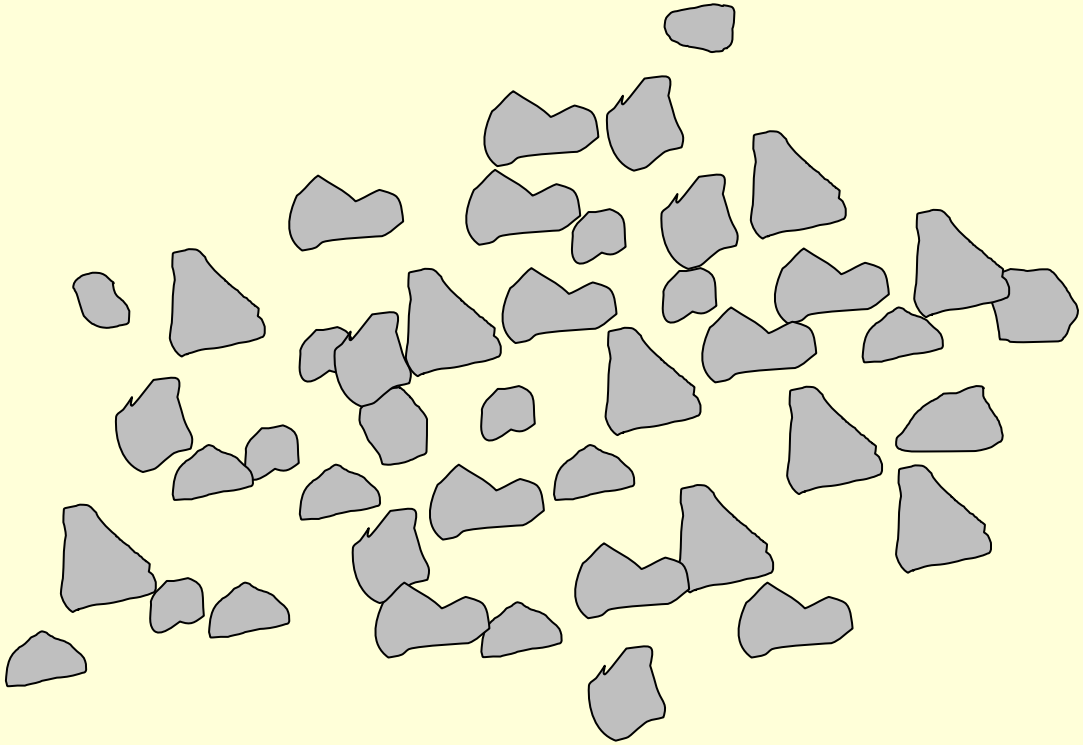
Vesper Sparrow

Western Meadowlark

Photos: BNA Online

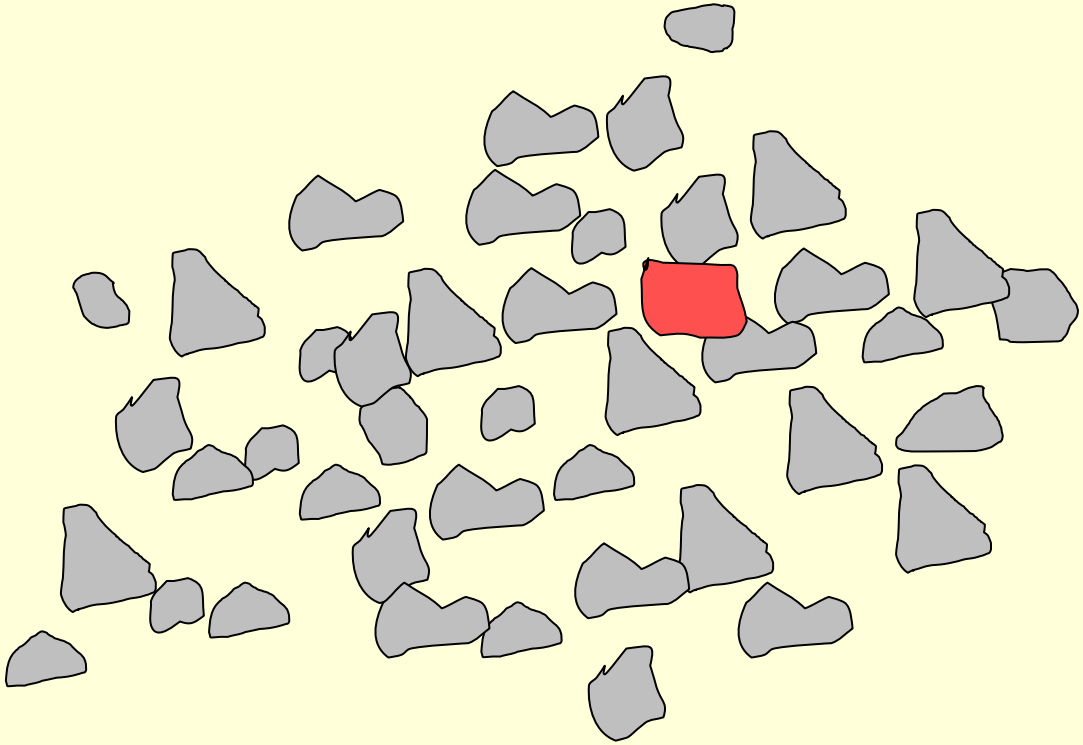
USGS

Spatial scale – Disturbance/territory



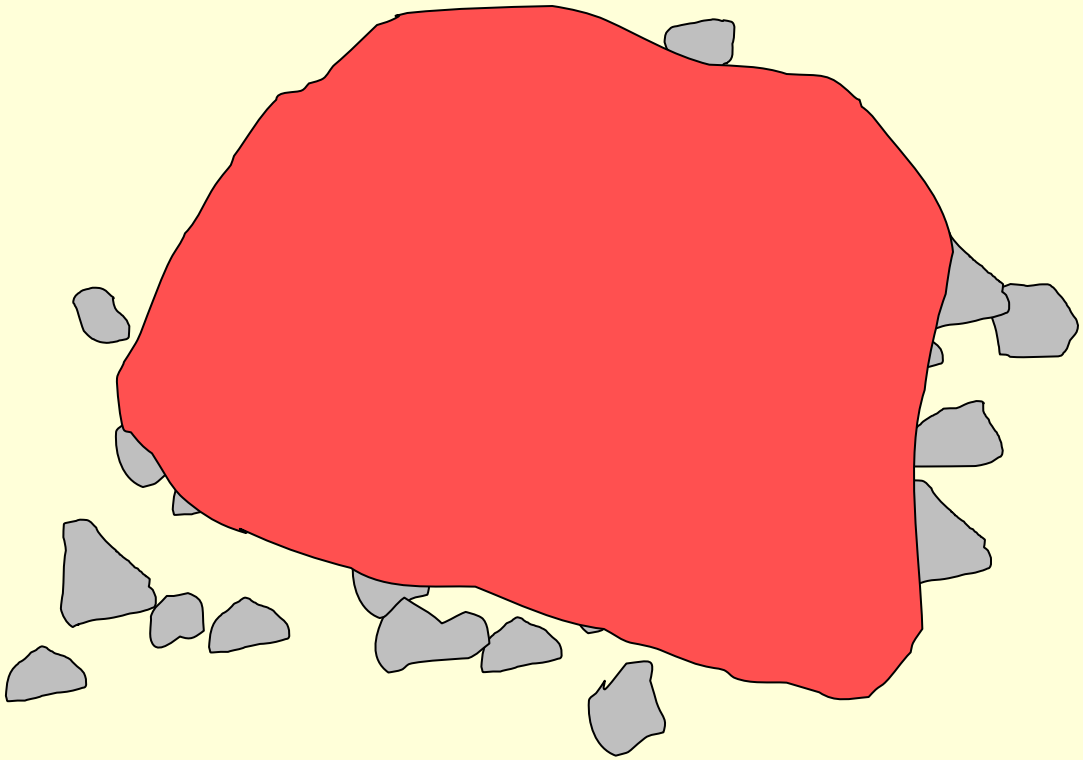
USGS

Spatial scale – Disturbance/territory

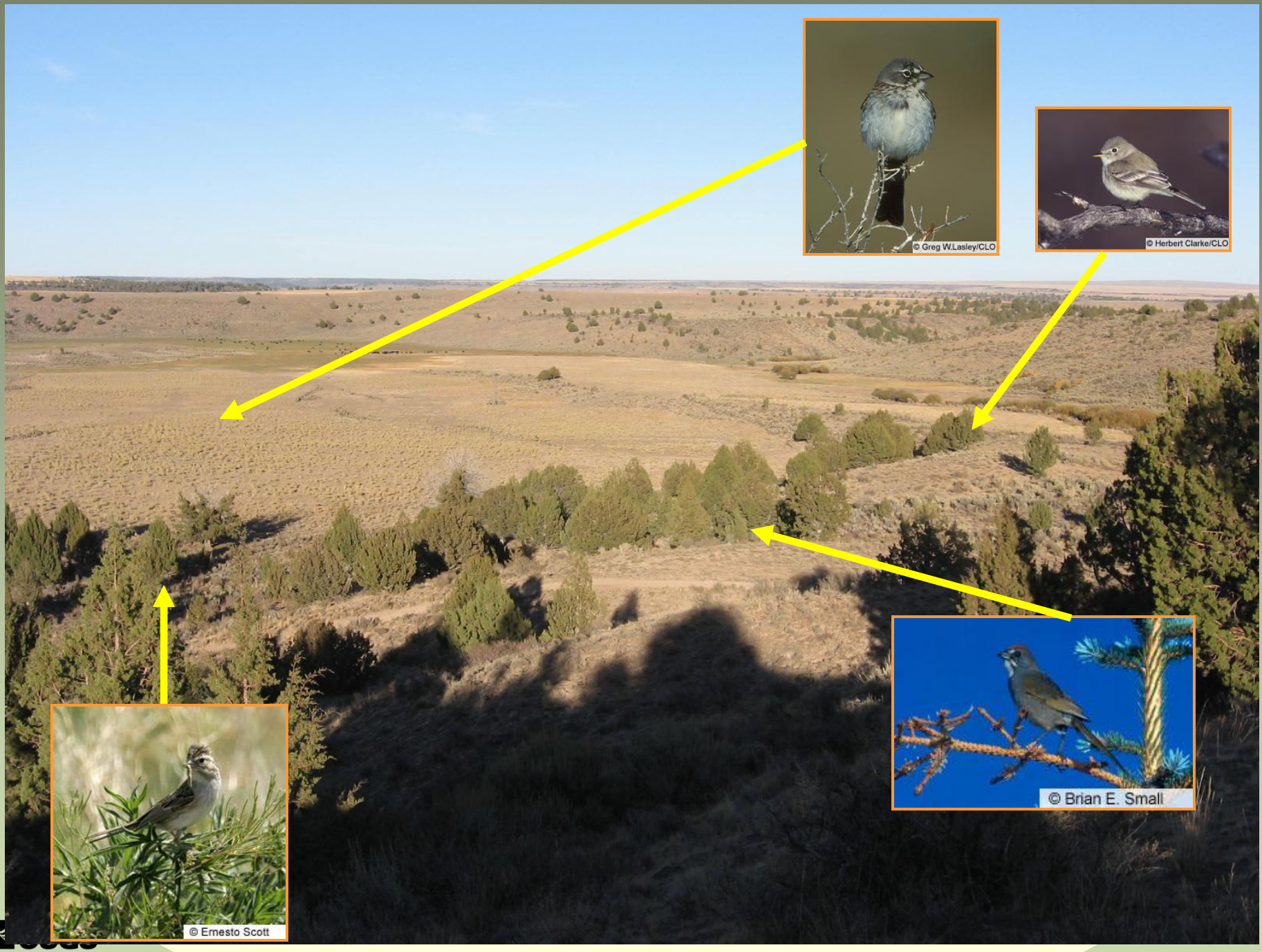


USGS

Spatial scale – Disturbance/territory



USGS

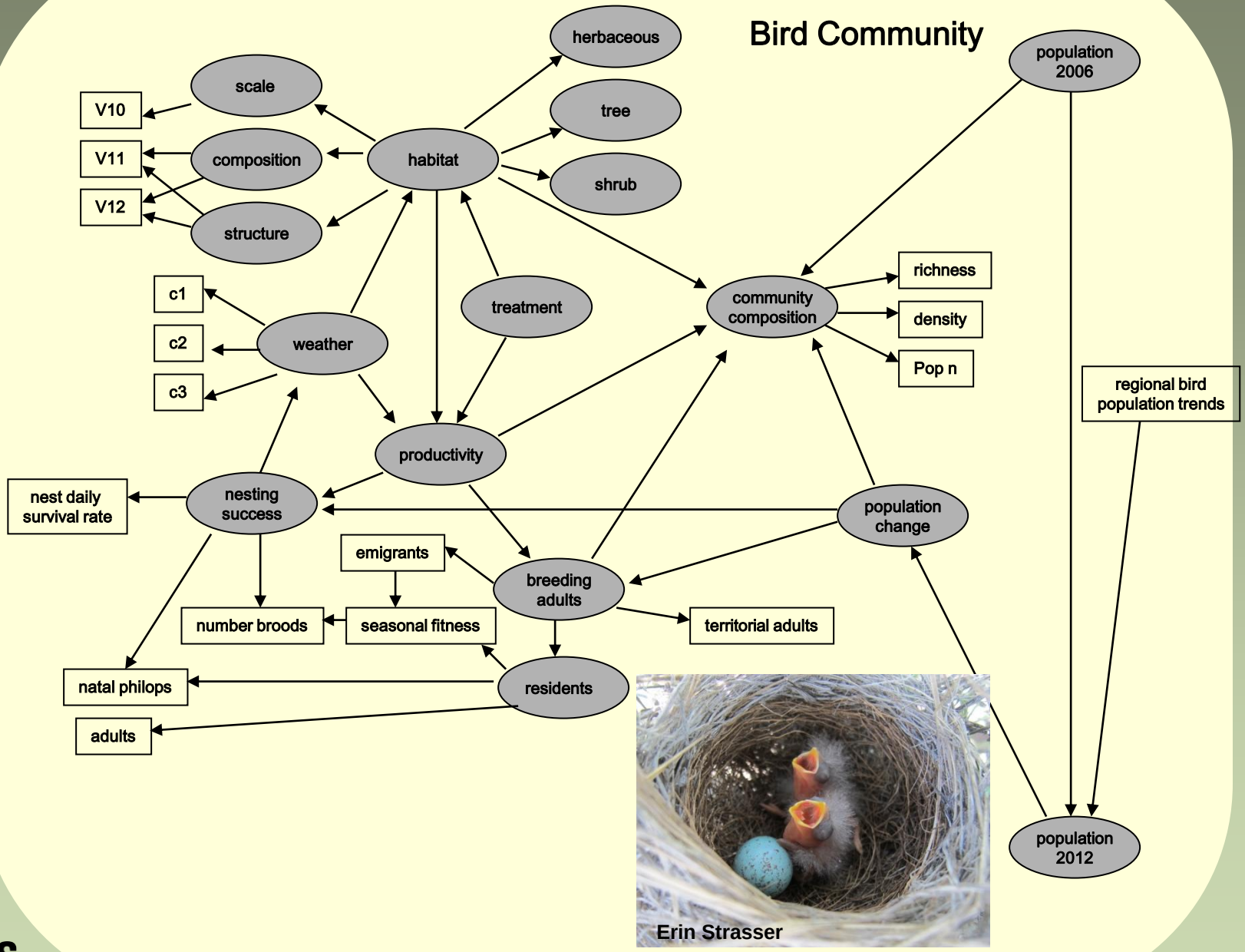

© Greg W.Lasley/CLO
© Herbert Clarke/CLO
© Brian E. Small
© Ernesto Scott

Objectives

- Delineate the organization of bird communities
- Identify the environmental gradients underlying bird communities
- Use changes in bird community to interpret the effects of management treatment

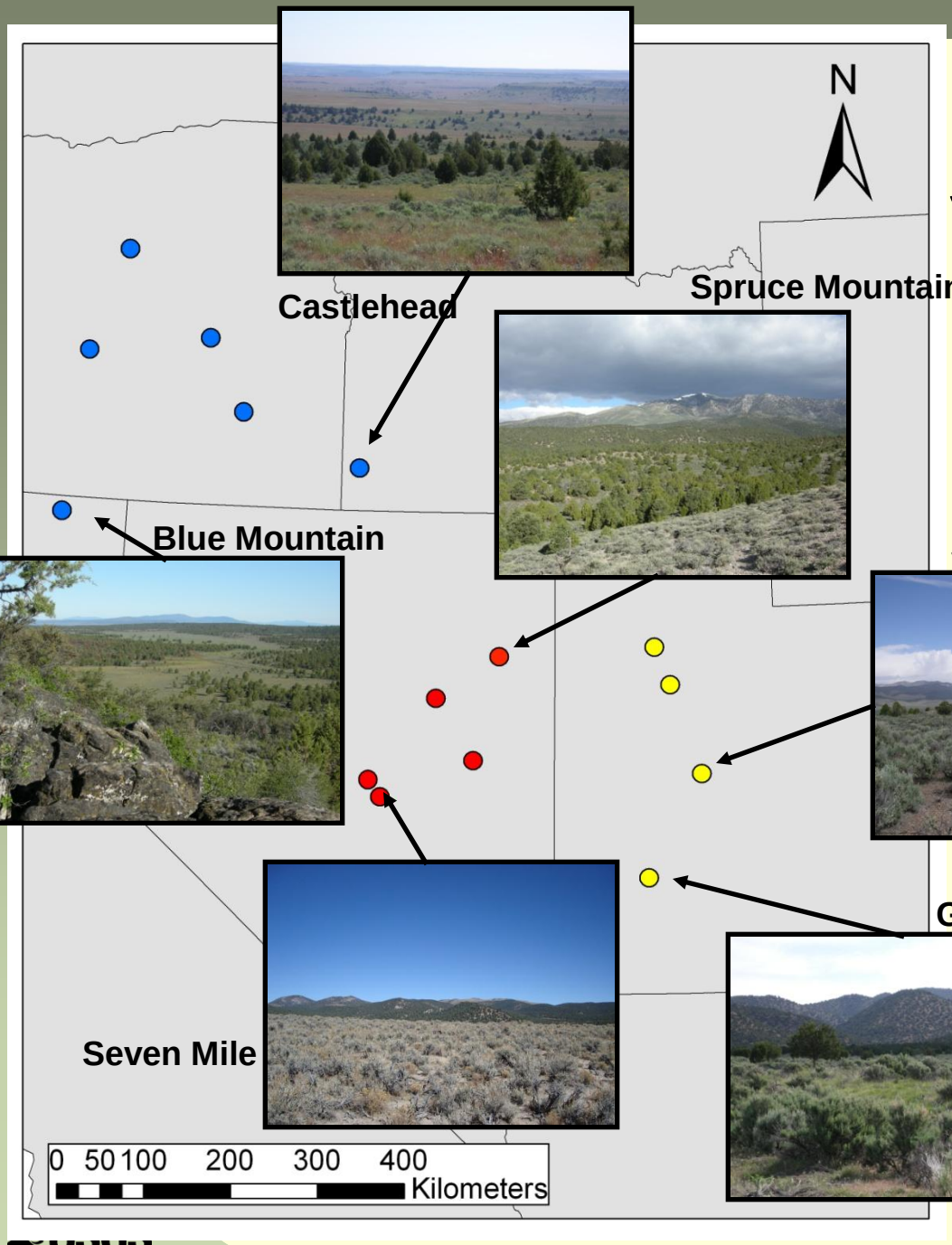
USGS

Bird Community



USGS

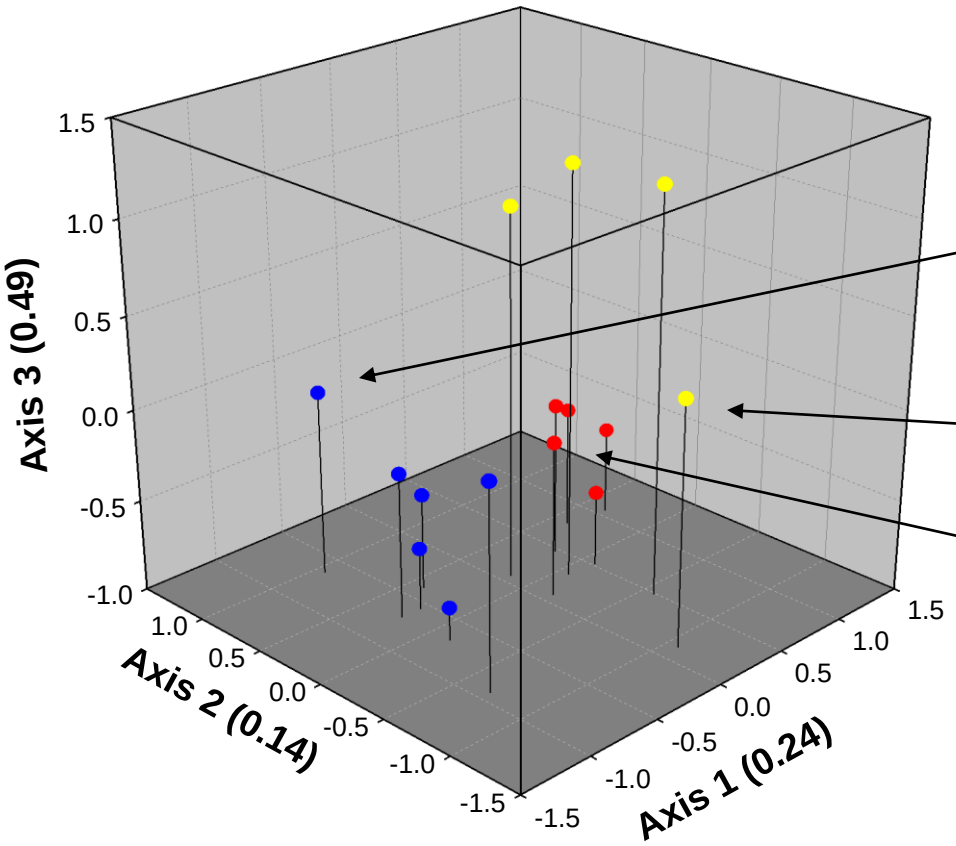
Study Sites and Woodland Ecosystems

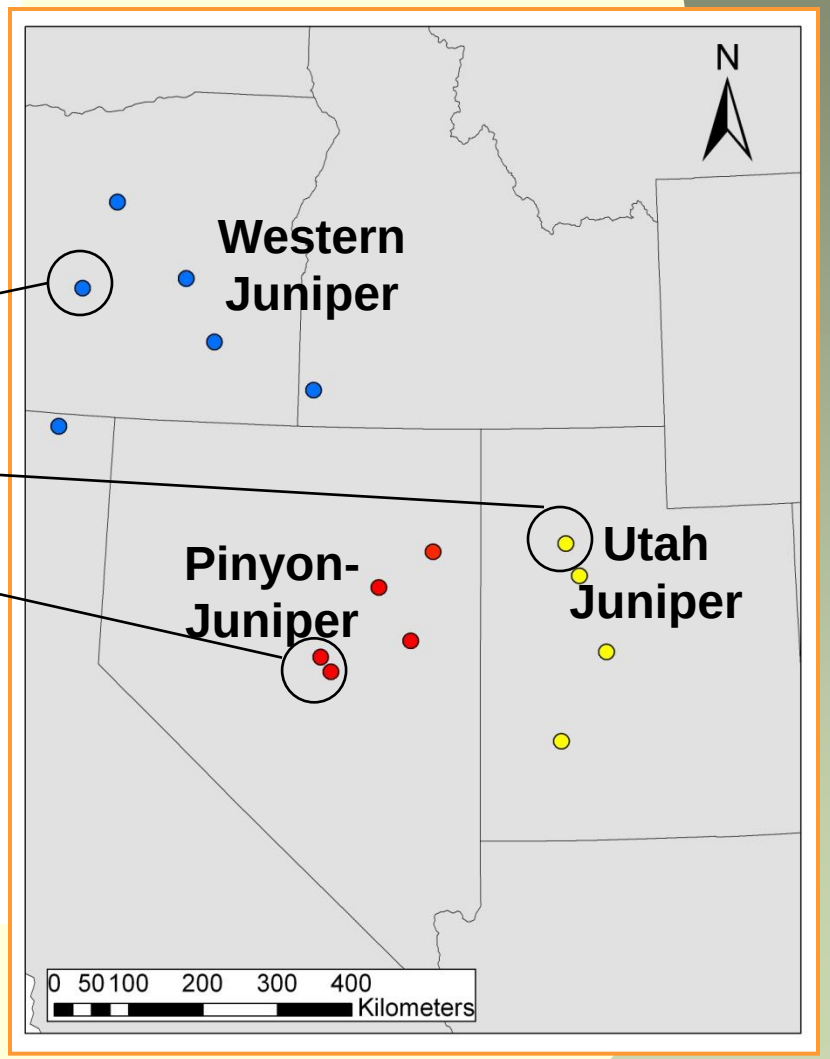


- Western Juniper
- Pinyon - Juniper
- Utah Juniper

Woodland Network

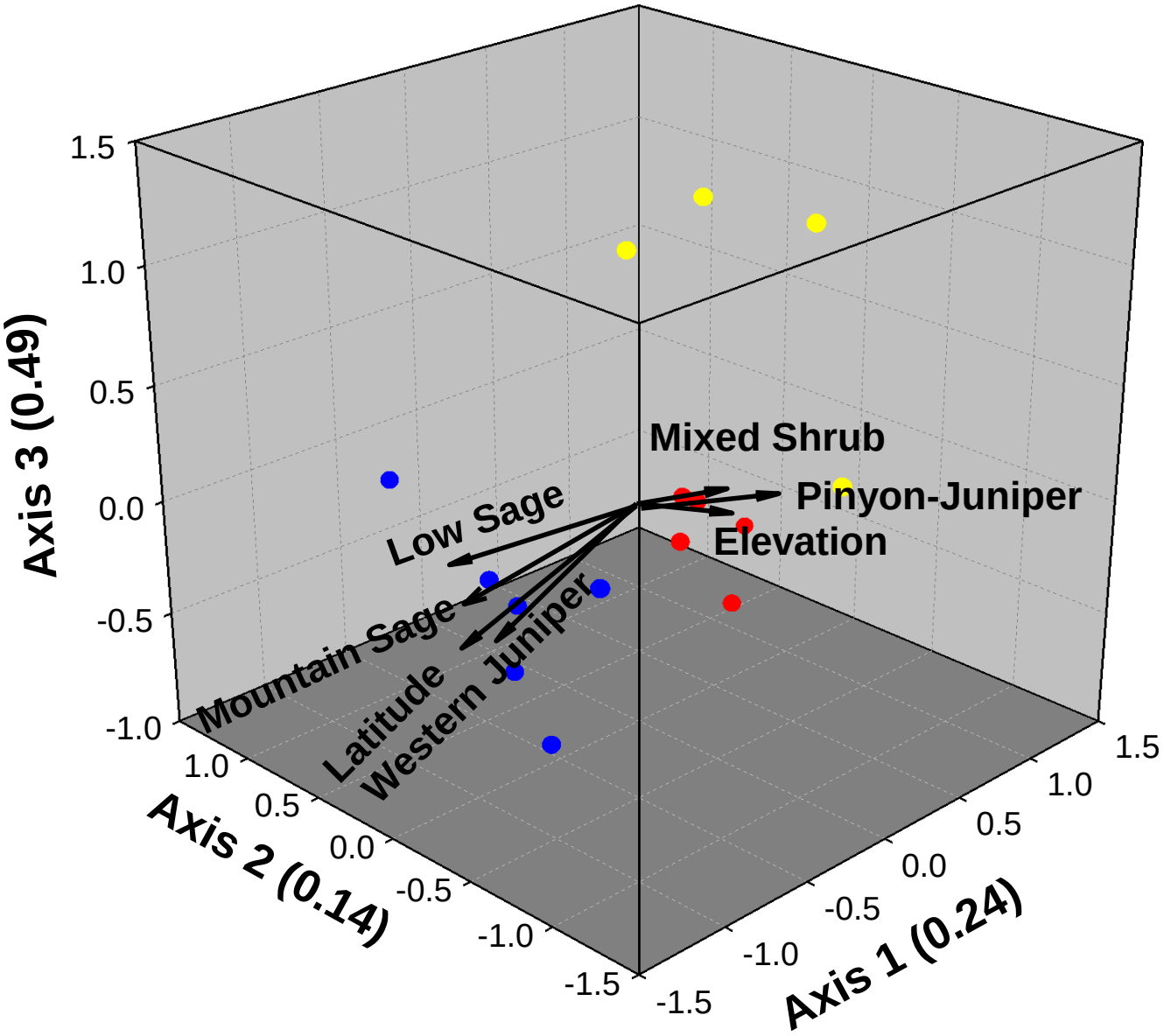
Site Ordination





USGS

Sites and Environmental Gradients



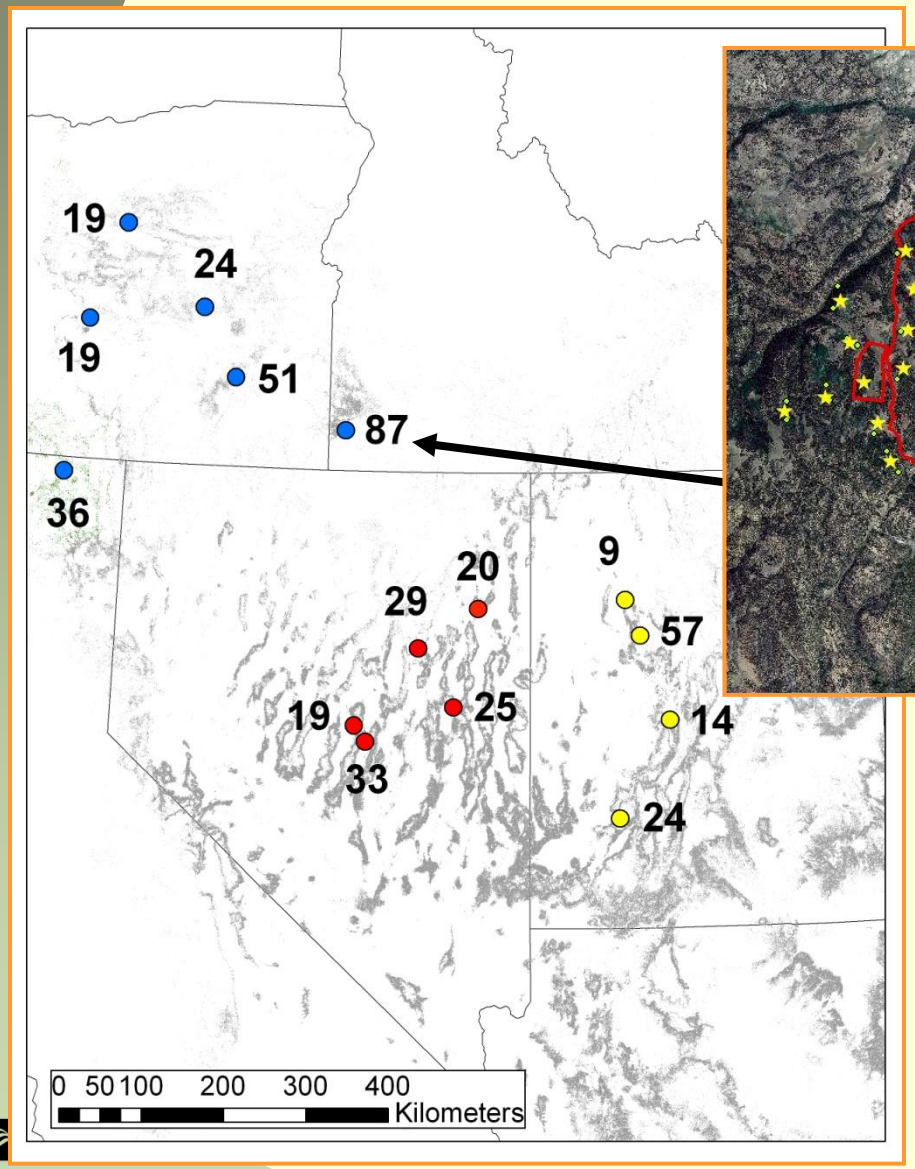
USGS

Study Design

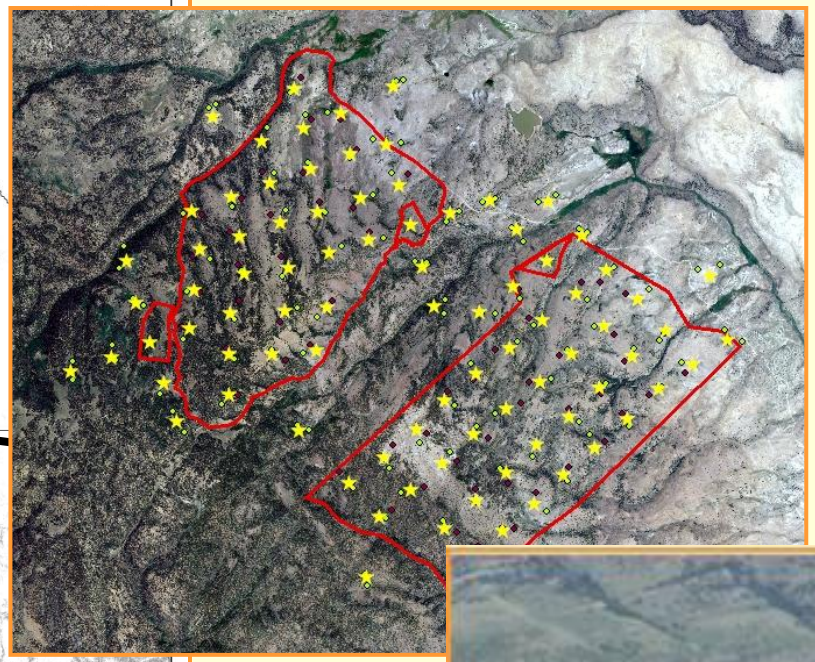
- Paired study sites
  - Treatment and Control
- Breeding bird point transects
- Vegetation plots
- Ordinations (CCA)

USGS

Point Transects



Castlehead Site, ID

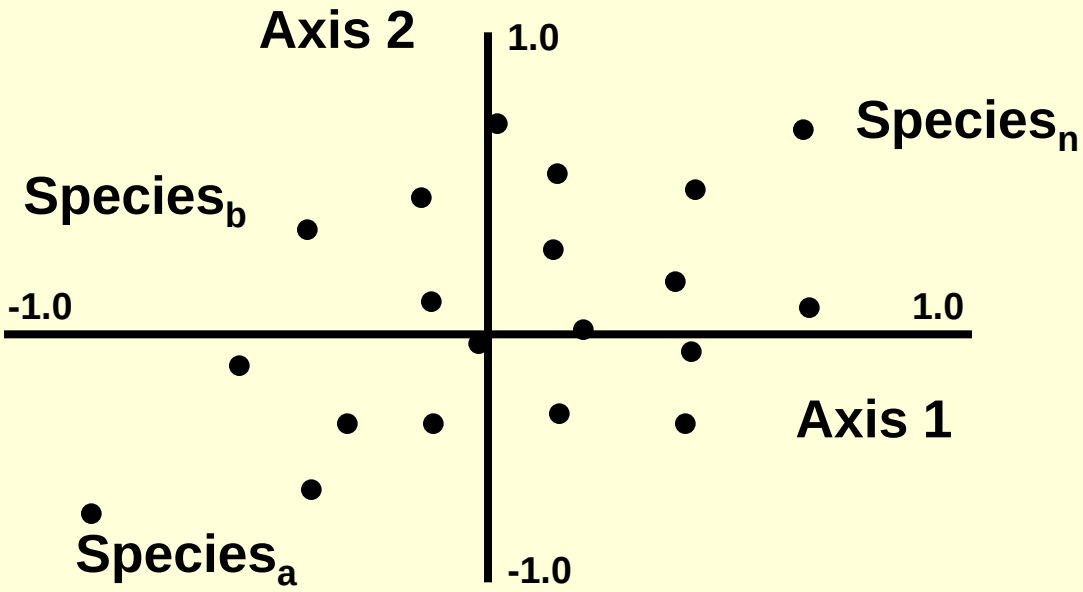


Vegetation Sampling

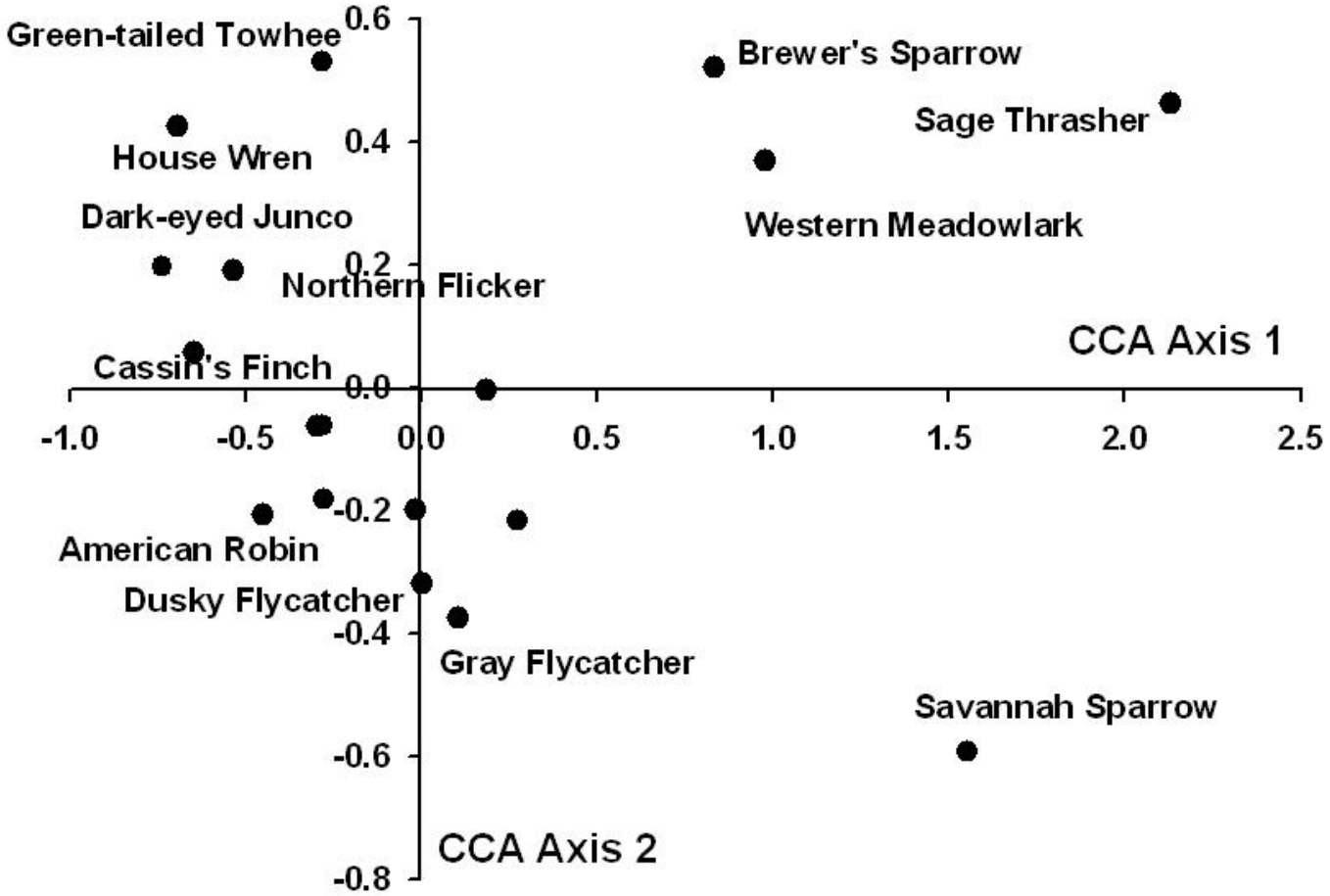
- 2 30 x 30 m sampling plots per point count
- Vegetation ground cover

USGS

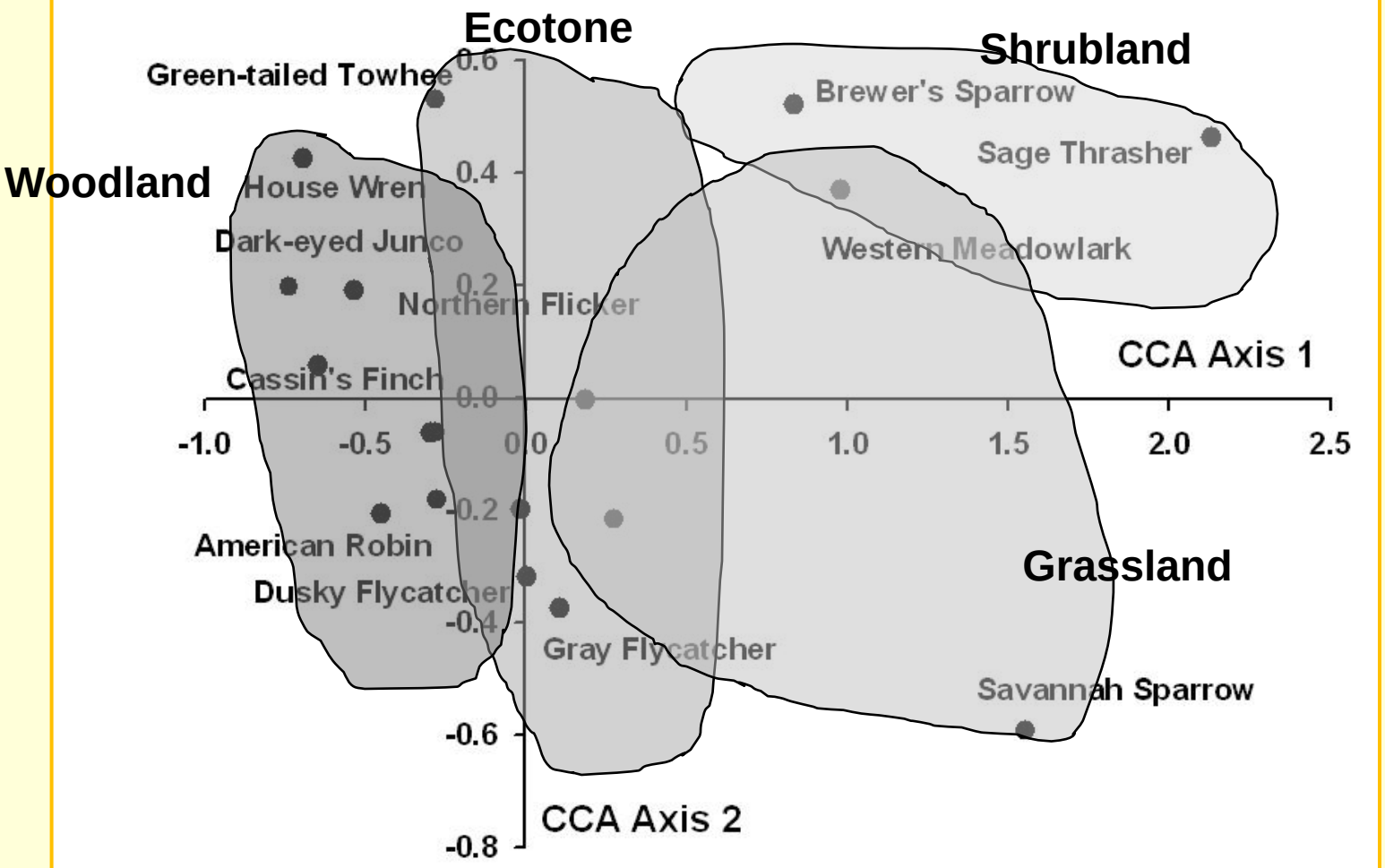
Ordination



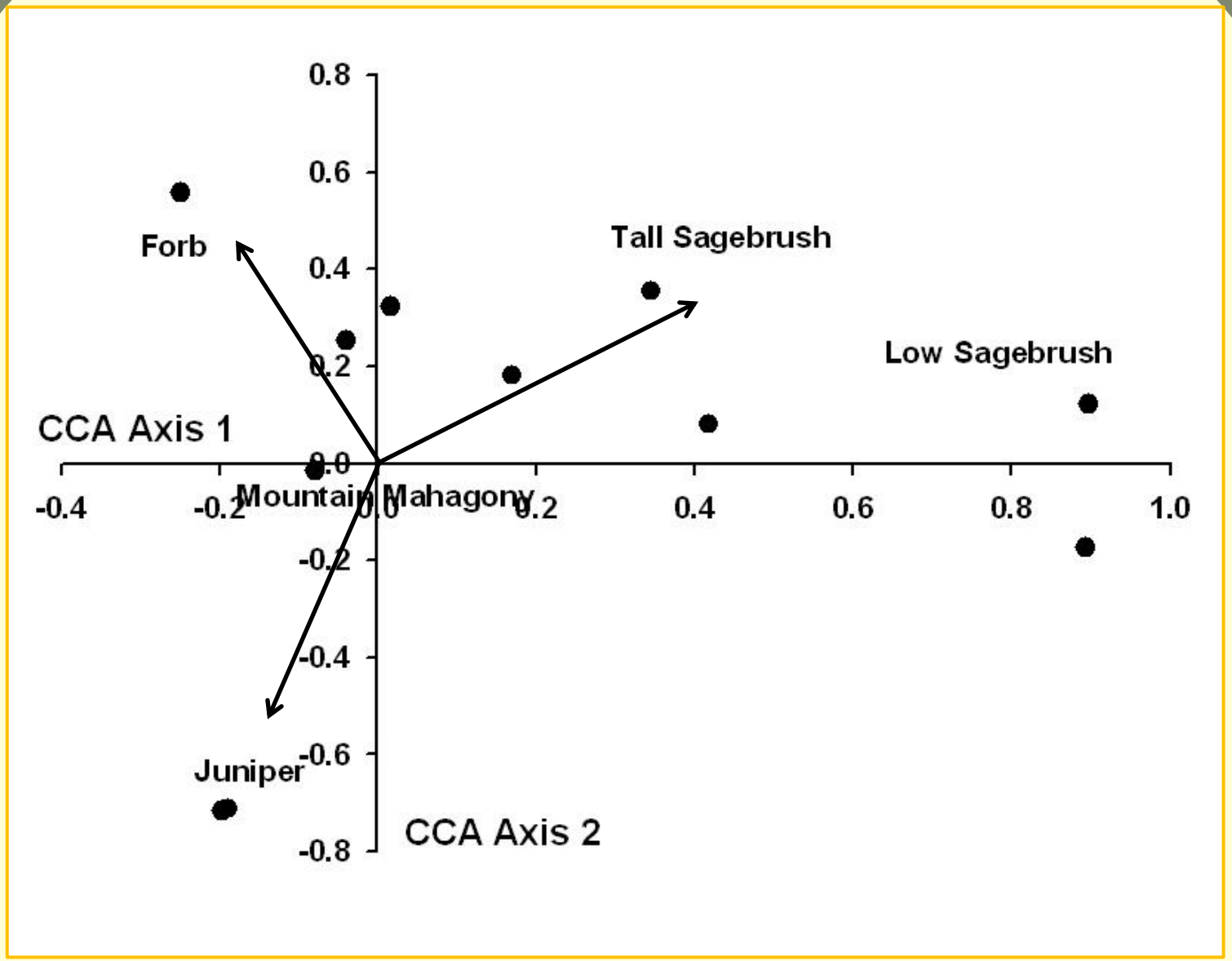
USGS


Green-tailed Towhee
Brewer's Sparrow
Sage Thrasher
House Wren
Western Meadowlark
Dark-eyed Junco
Northern Flicker
Cassin's Finch
CCA Axis 1
American Robin
Dusky Flycatcher
Gray Flycatcher
Savannah Sparrow
CCA Axis 2
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5

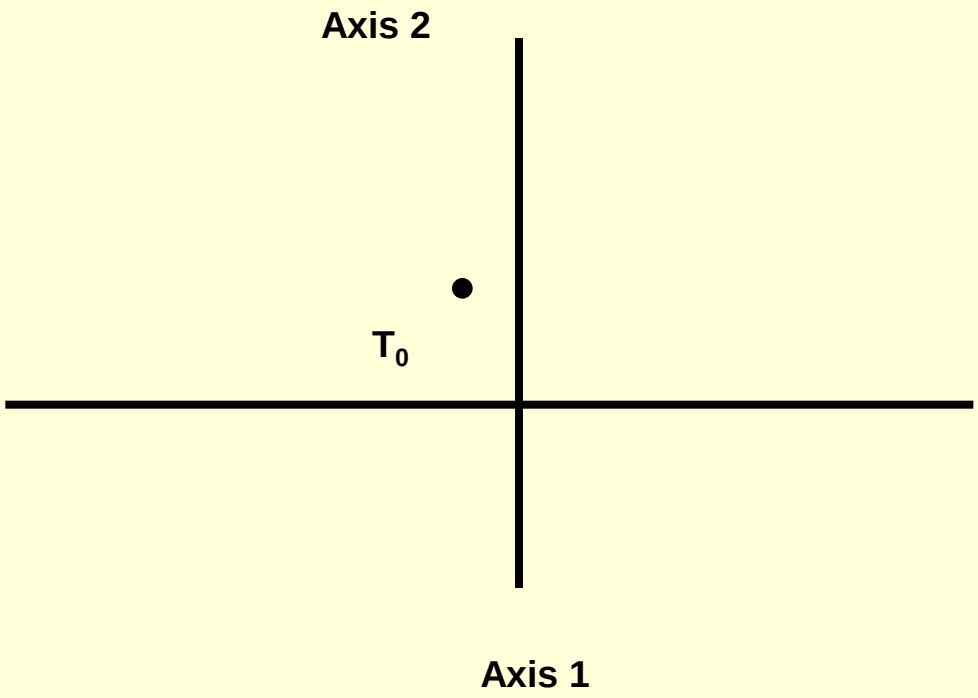
USGS

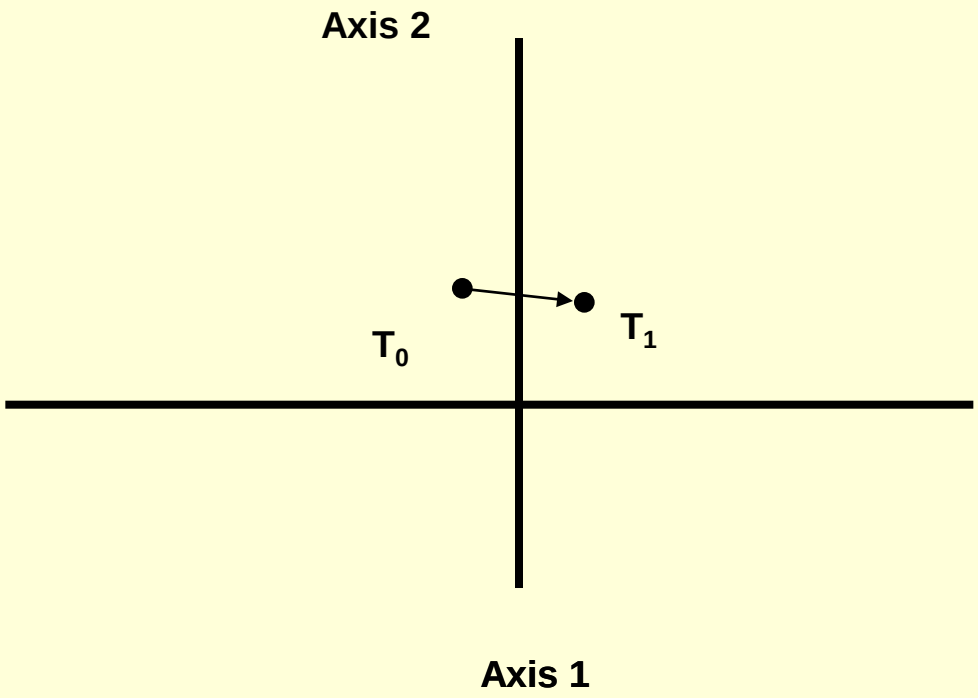

Ecotone
Shrubland
Woodland
Grassland
Green-tailed Towhee
Brewer's Sparrow
Sage Thrasher
House Wren
Dark-eyed Junco
Western Meadowlark
Northern Flicker
Cassin's Finch
CCA Axis 1
American Robin
Dusky Flycatcher
Gray Flycatcher
Savannah Sparrow
CCA Axis 2
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5

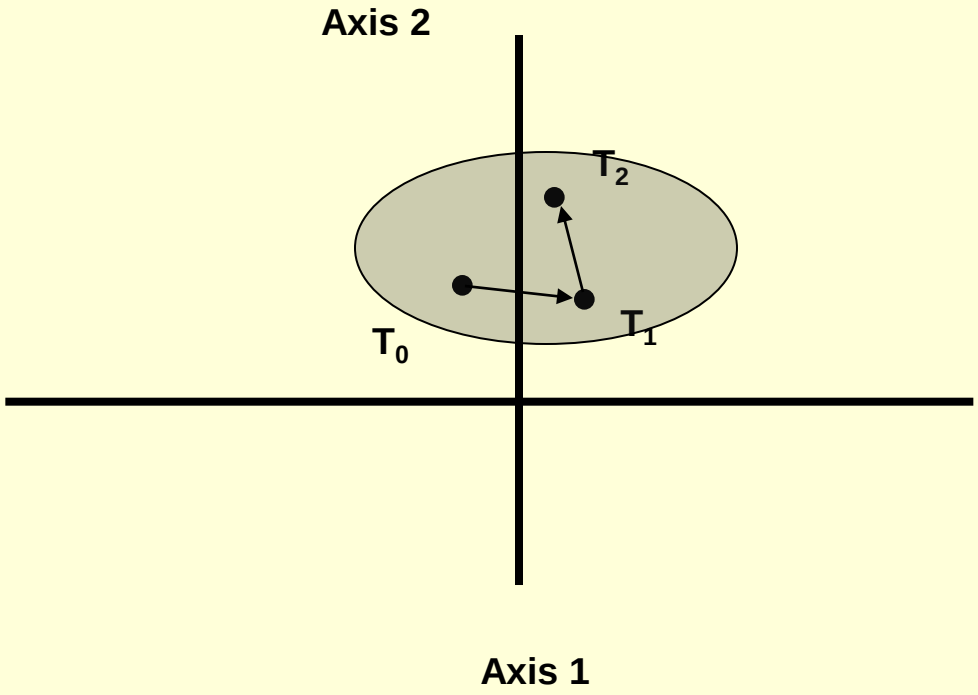
USGS

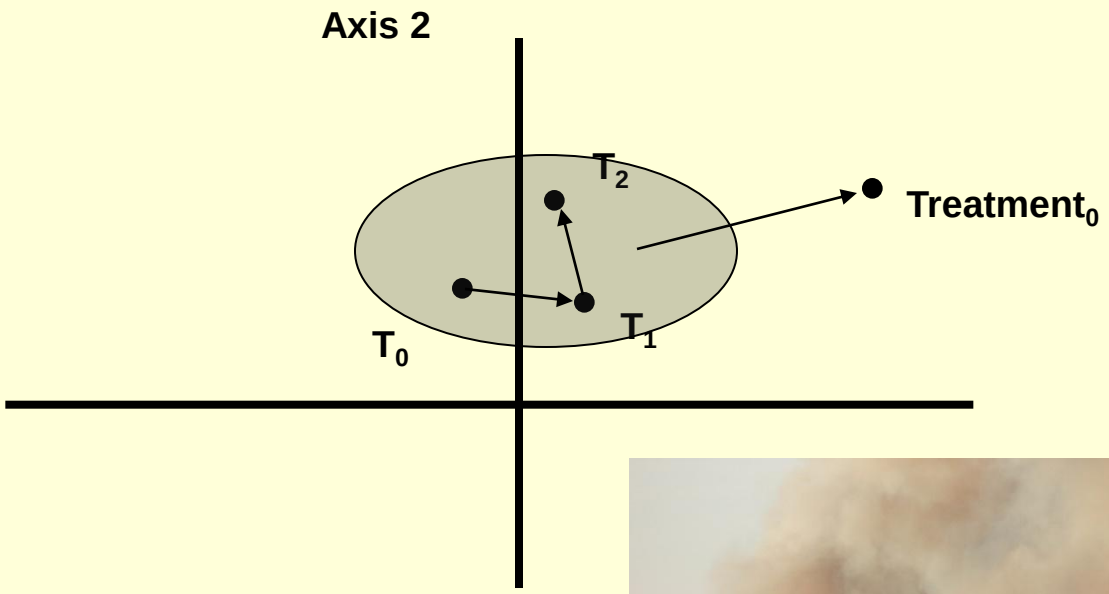

0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-0.4
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
Forb
Tall Sagebrush
Low Sagebrush
Mountain Mahagony
Juniper
CCA Axis 1
CCA Axis 2

USGS


Axis 2
T_0
Axis 1

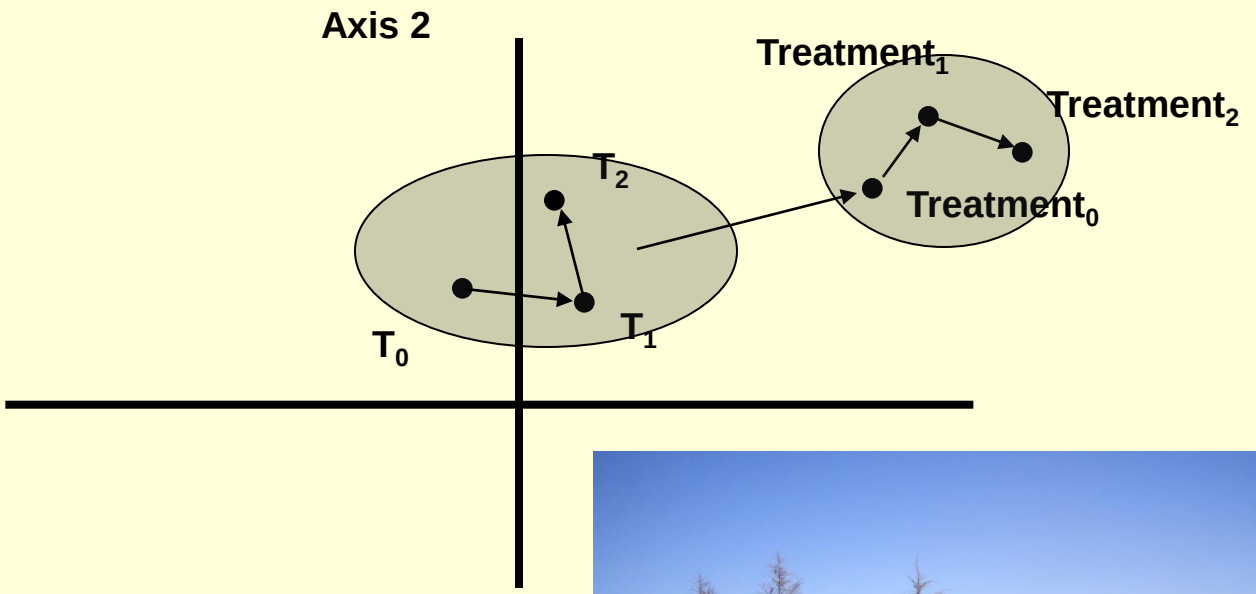

Axis 2
T_0
T_1
Axis 1


Axis 2
T2
T1
T0
Axis 1

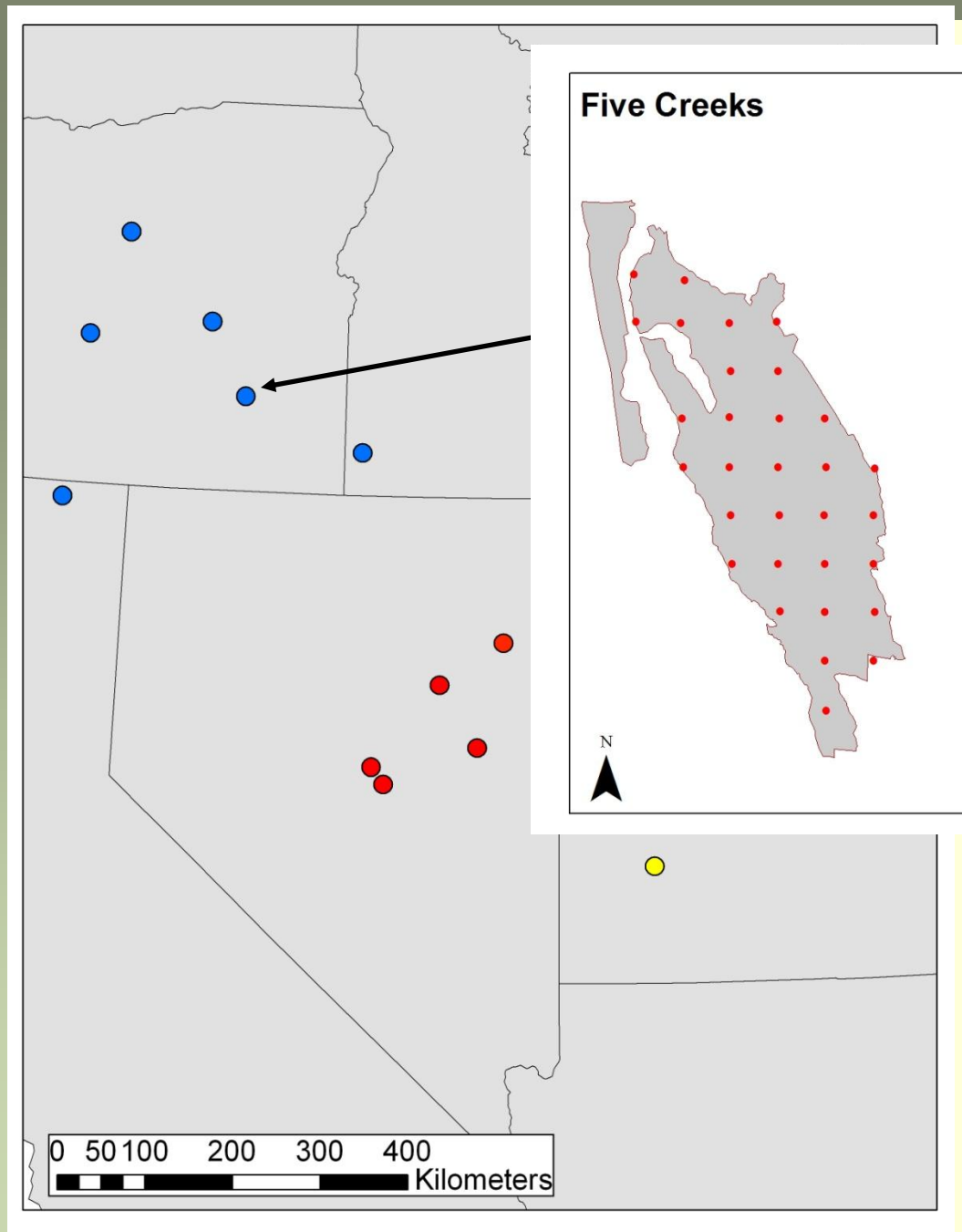


courtesy Jeff Rose

USGS



USGS


0 50 100 200 300 400
Kilometers

Five Creeks
Point Counts
Control
Treatment
Burned
Boundaries
burn extensive
control extensive
N
0 0.5 1 2
km

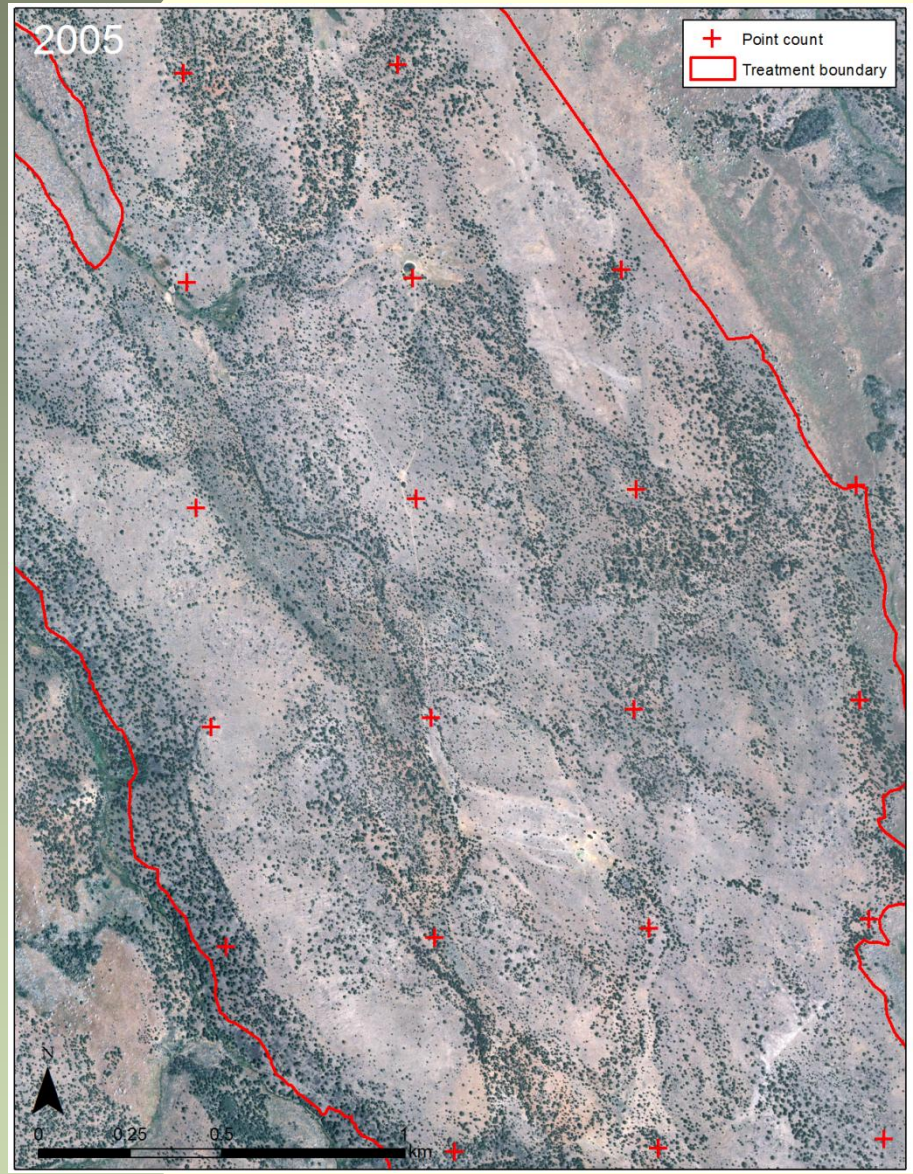
Five Creeks

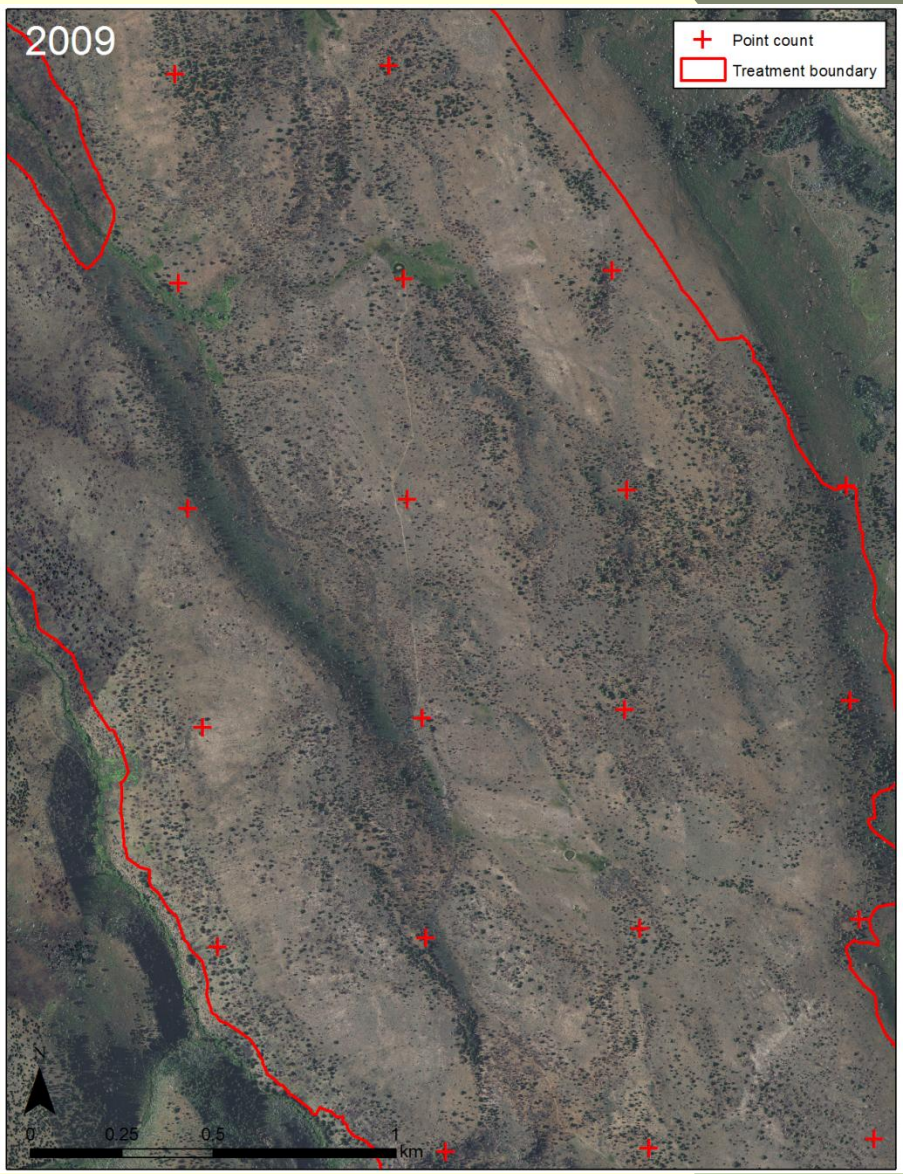
- Burned in Fall 2008
  - Pre-treatment data collected in 2008
- 5300-6300 ft elevation
- Western juniper, mountain big sagebrush, and low sagebrush with a mixture of native grasses (Sandberg bluegrass, Idaho fescue, and squirrel tail).
- 83% of veg point associated with PC's burned
- 76.6% of area within burn plots was actually burned

Pre-treatment
2008
Post-treatment
2009
2010
2011

USGS

Five Creeks





2005 Pre-Treatment

1 km

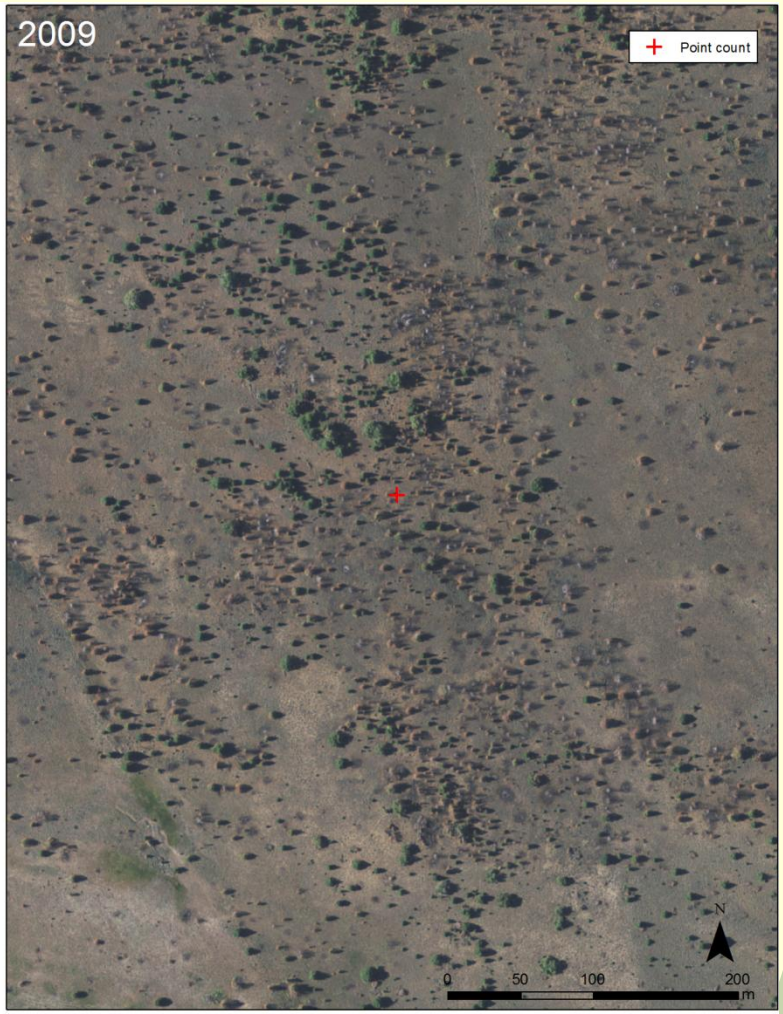
2009 Post-Treatment

USGS

Five Creeks

200 m

2005 Pre-Treatment



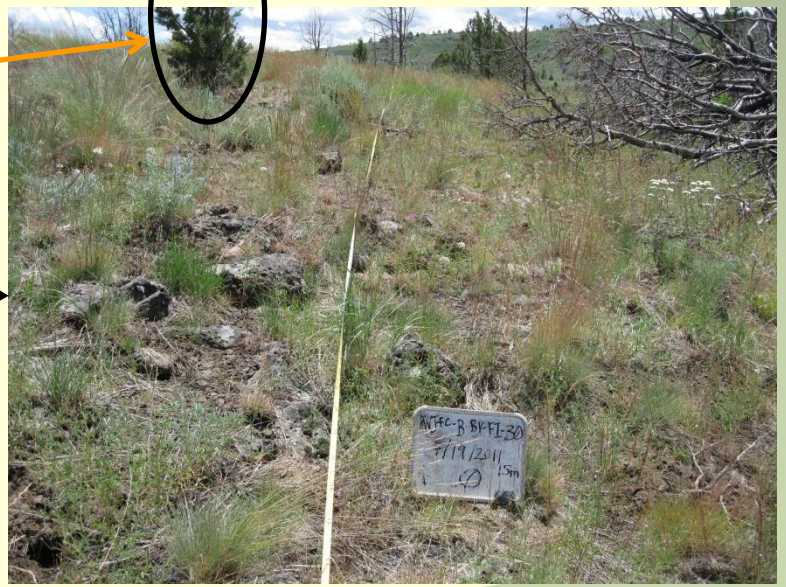
2009 Post-Treatment

USGS

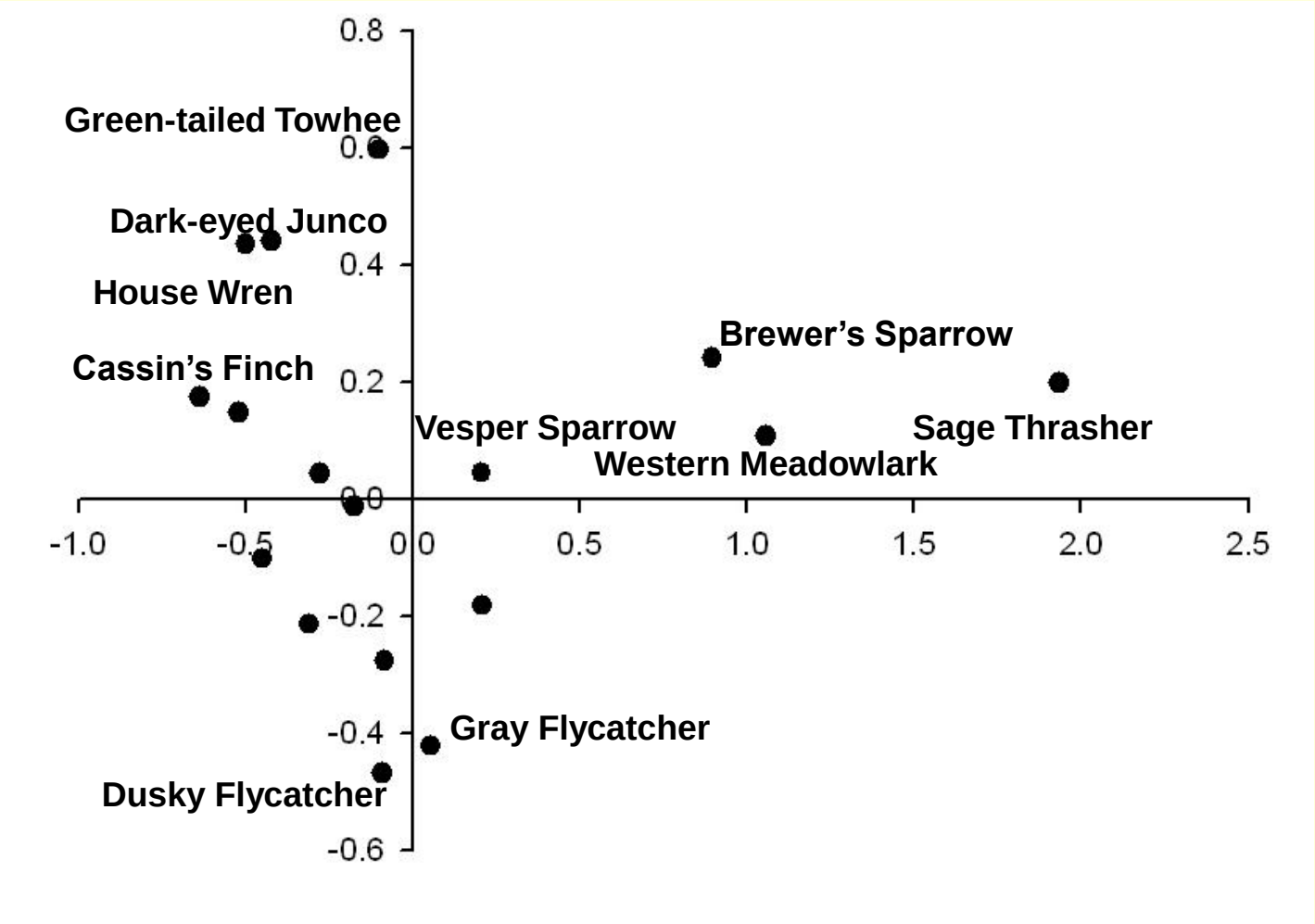
Five Creeks

2008

2011

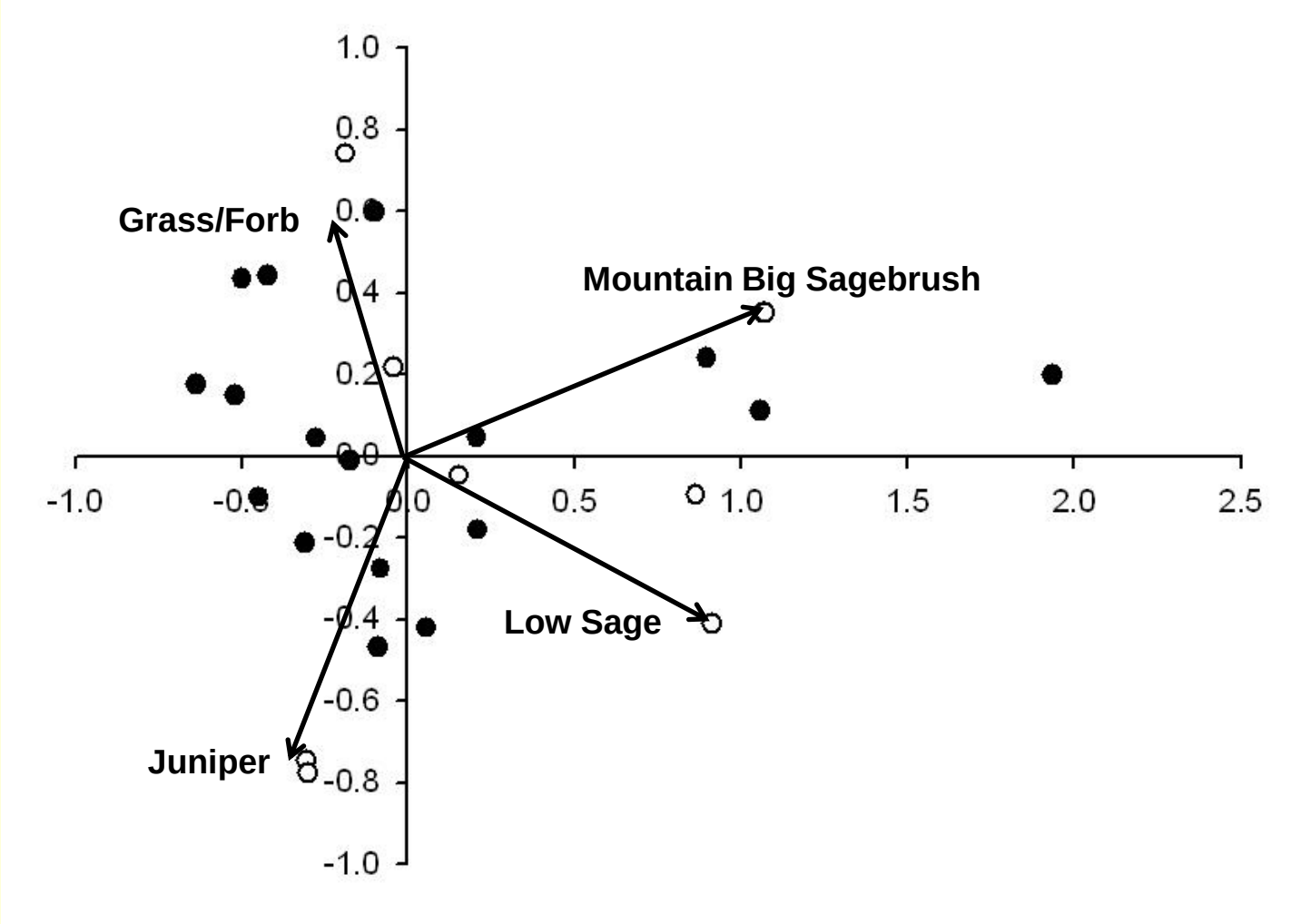


Five Creeks



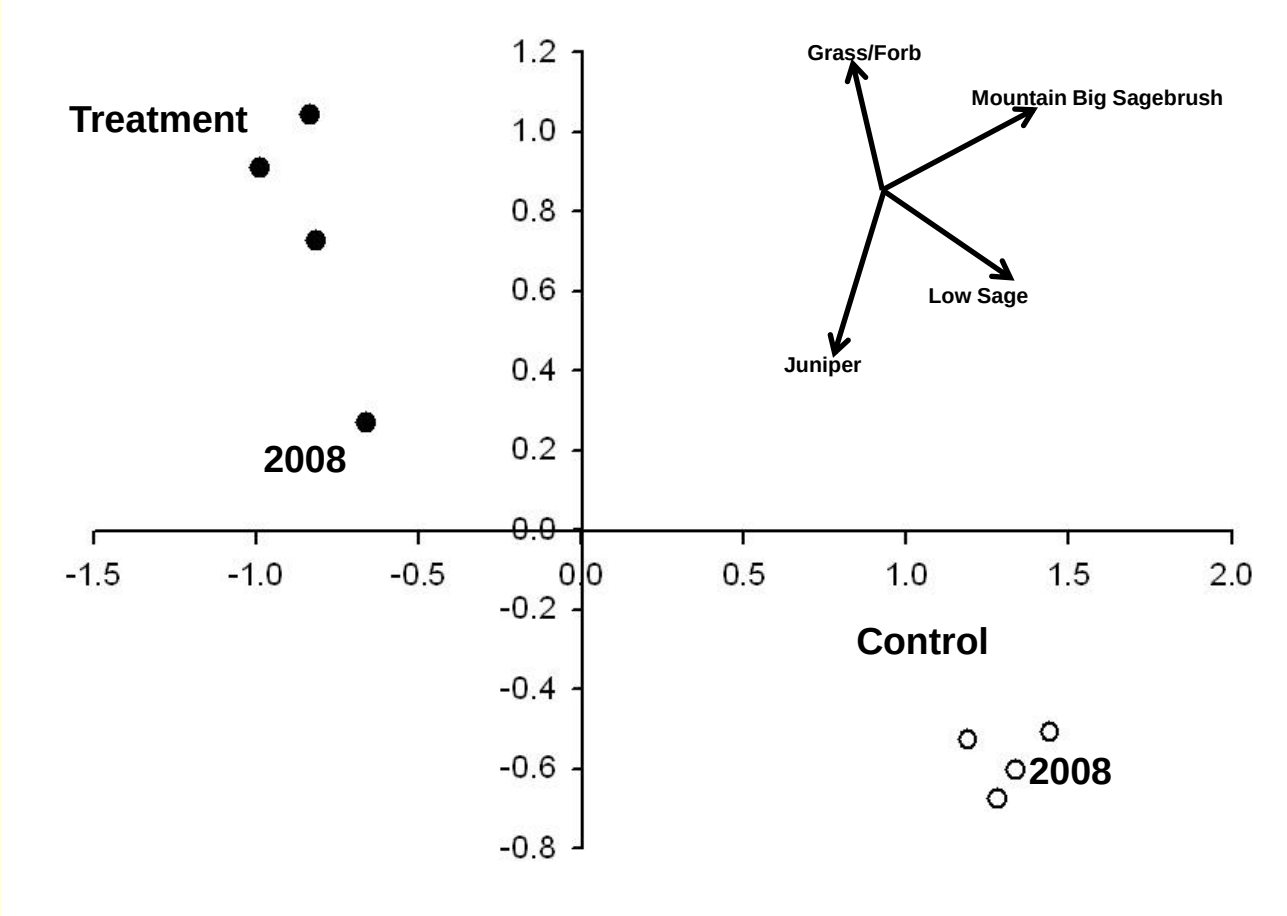
USGS

Five Creeks



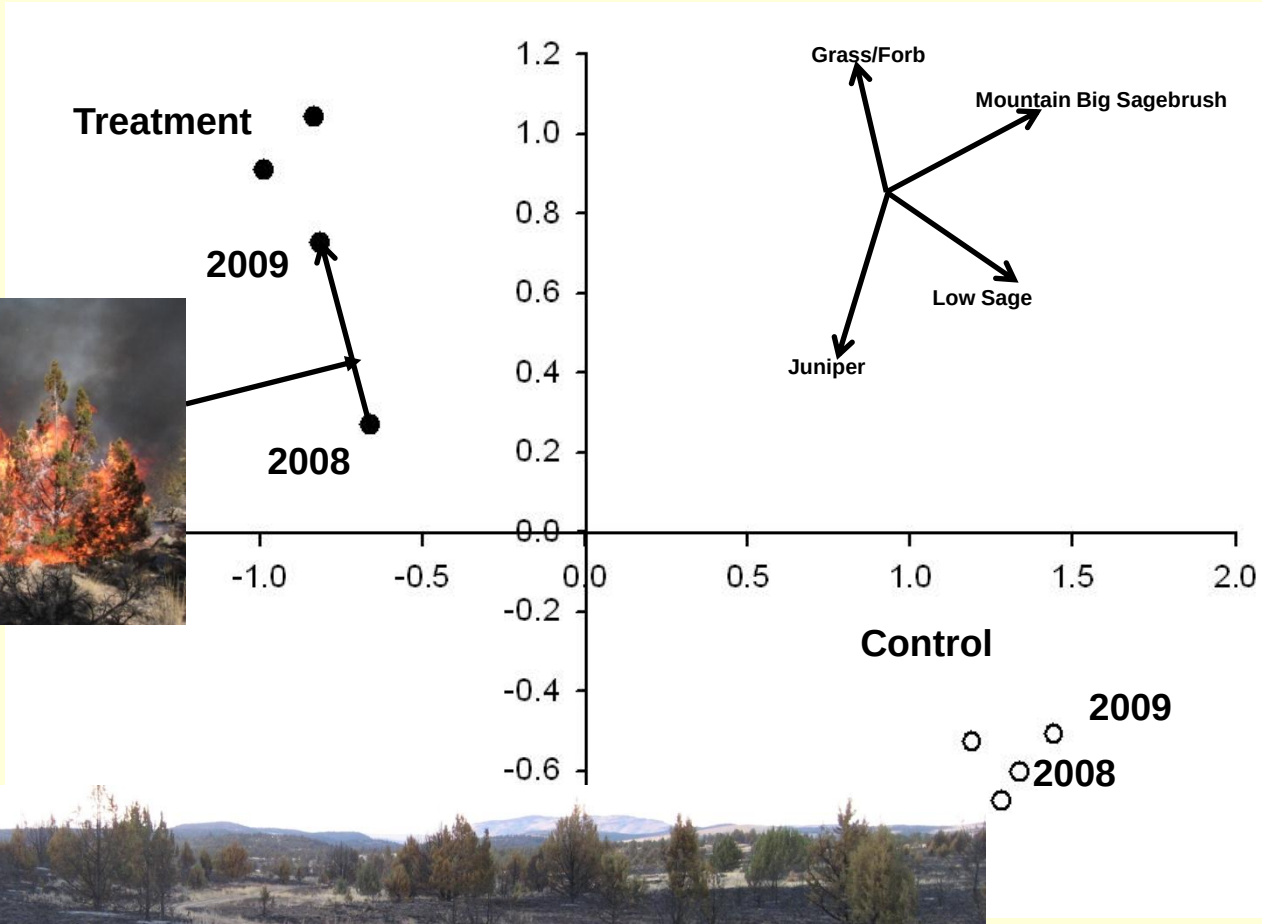
USGS

Five Creeks

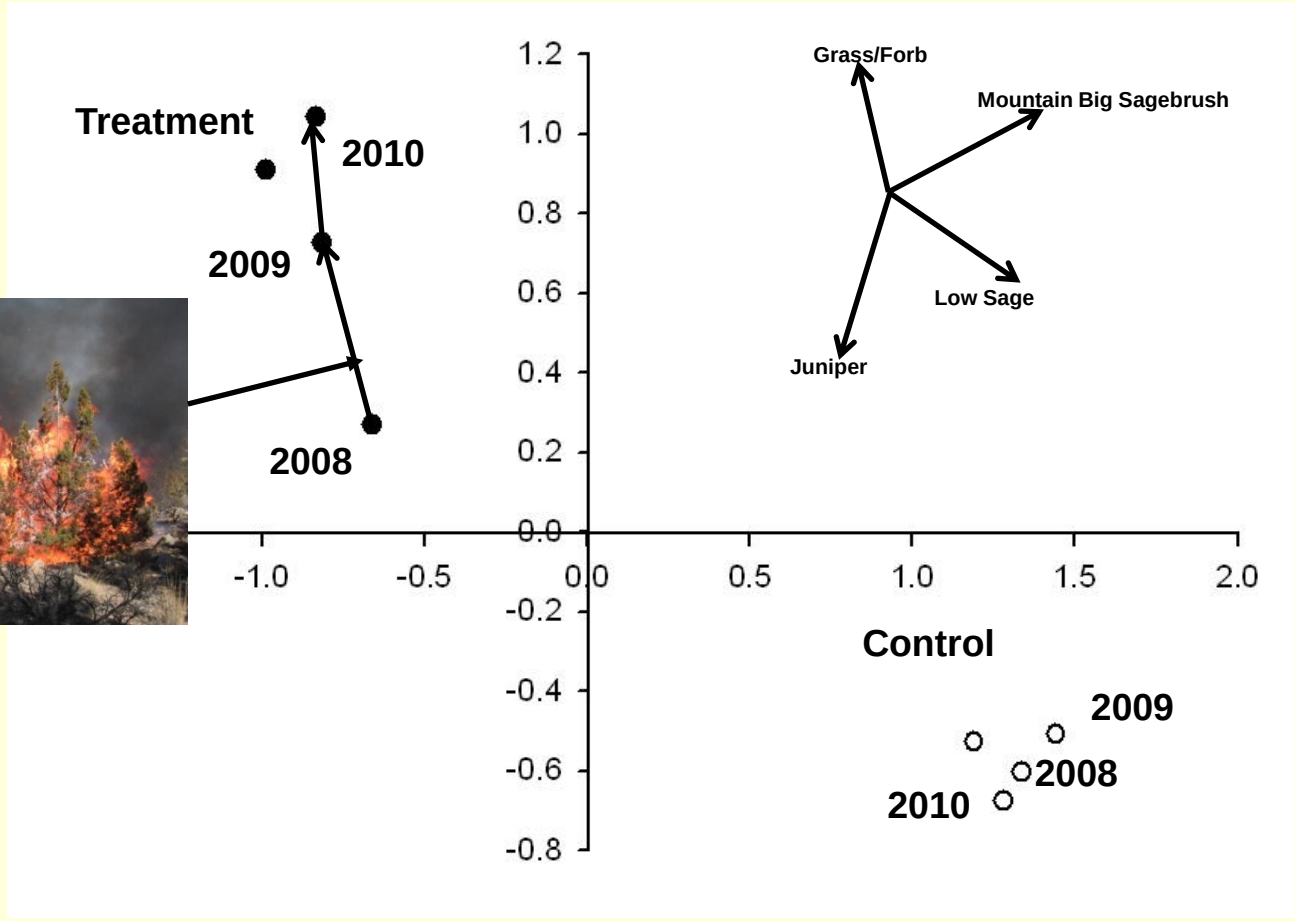


USGS

Five Creeks

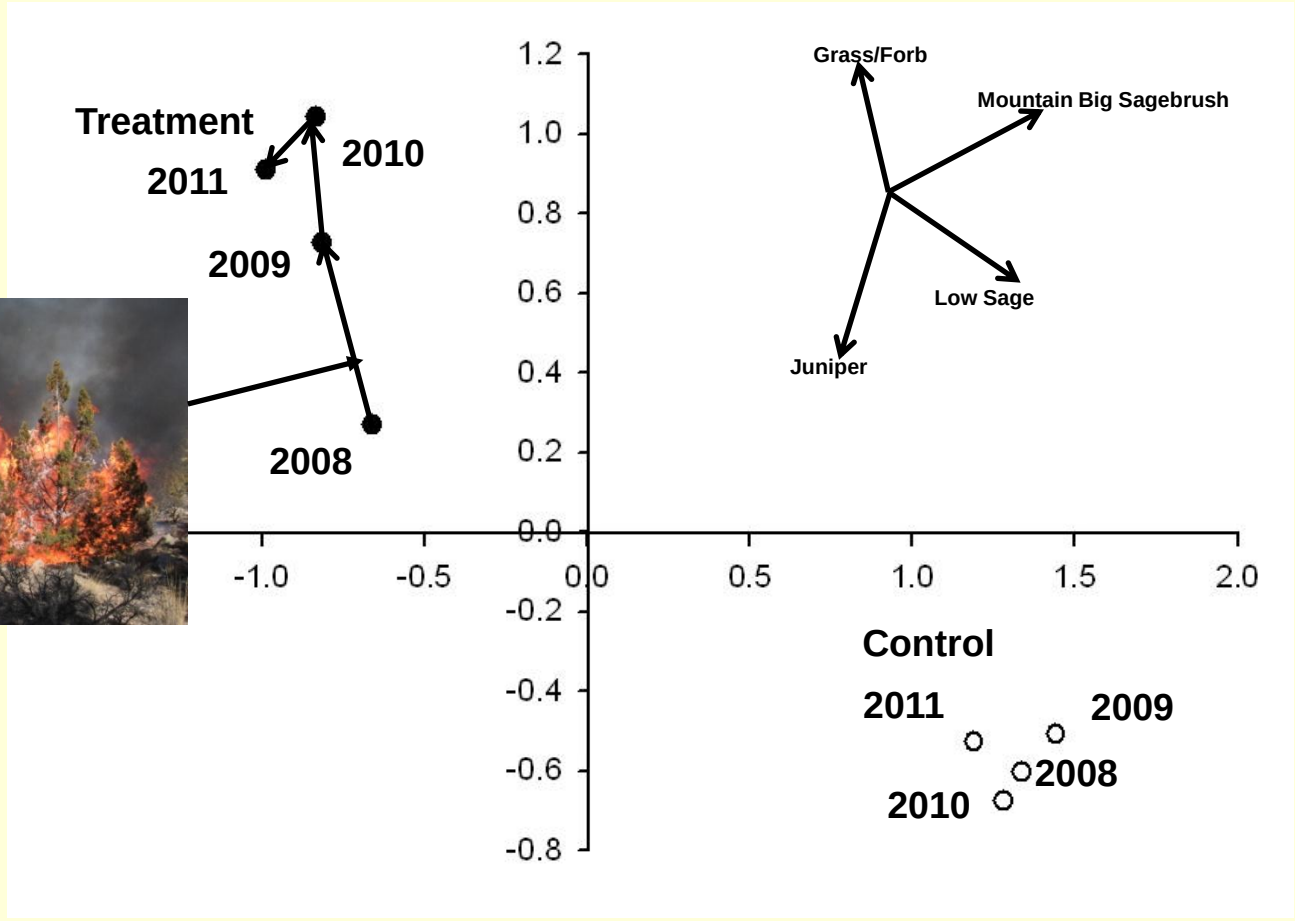

Treatment
2009
2008
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
Grass/Forb
Mountain Big Sagebrush
Low Sage
Juniper
Control
2009
2008

Five Creeks

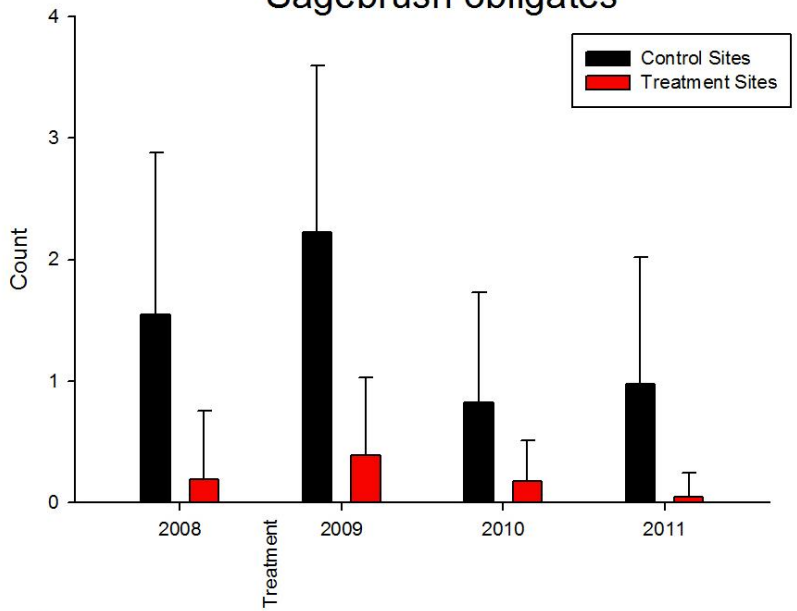


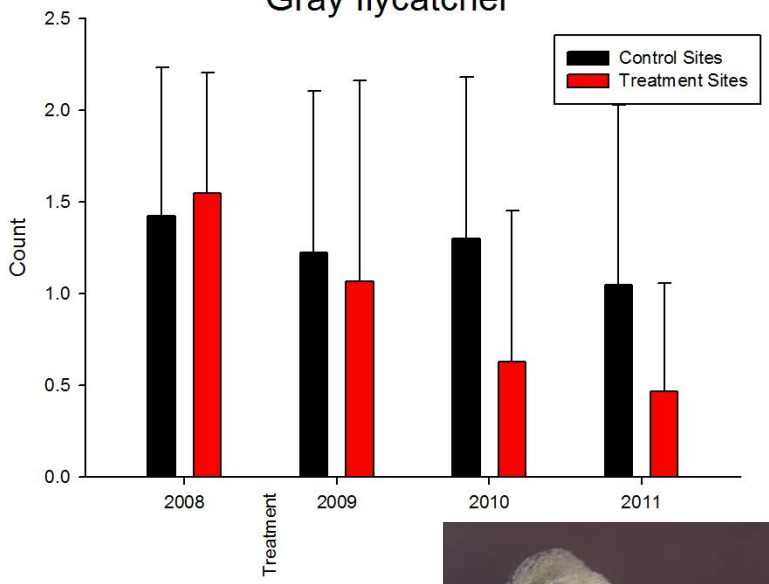
USGS

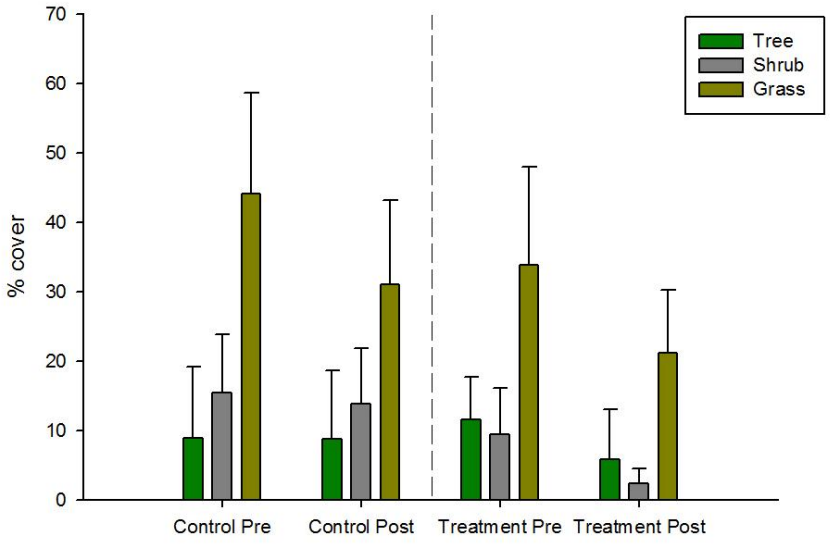
Five Creeks



USGS


Sagebrush obligates
Control Sites
Treatment Sites
Count
0
1
2
3
4
2008
2009
2010
2011
Treatment


Gray flycatcher
Control Sites
Treatment Sites
Count
0.0
0.5
1.0
1.5
2.0
2.5
2008
2009
2010
2011
Treatment


Tree
Shrub
Grass
% cover
0
10
20
30
40
50
60
70
Control Pre
Control Post
Treatment Pre
Treatment Post

USGS

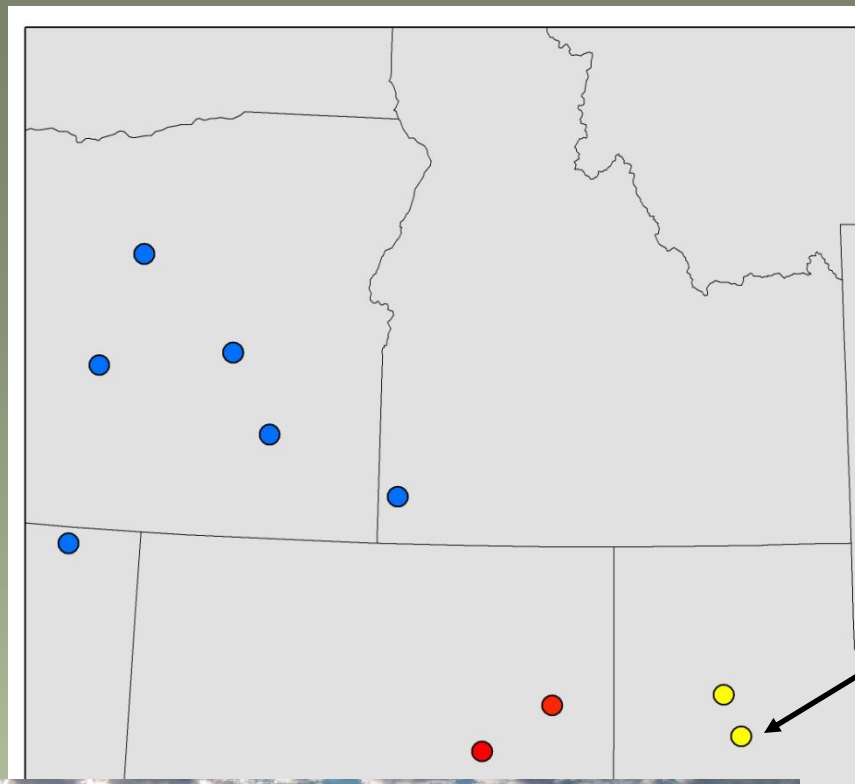
Five Creeks
Bird Response

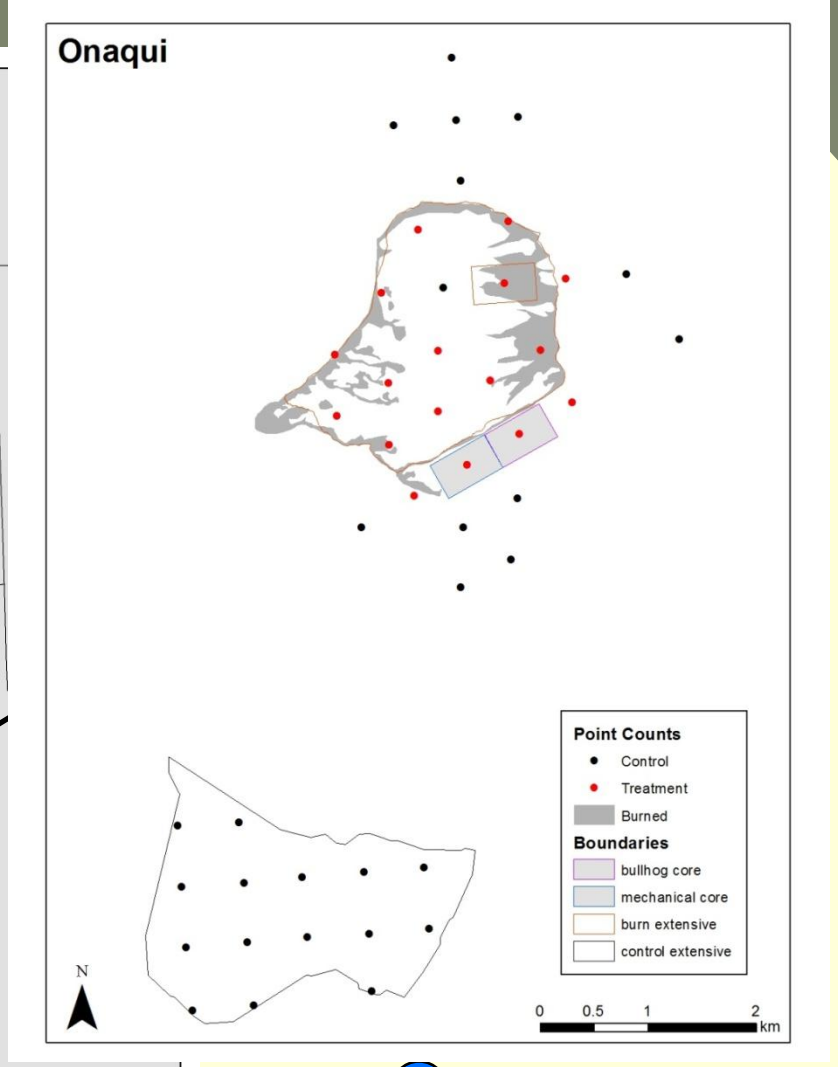
- Species richness remained the same

Winners*	Losers*	No Change
American Robin	Chipping Sparrow	Brewer's Sparrow
Dark-eyed Junco	Gray Flycatcher	Cassin's Finch
Northern Flicker	Green-tailed Towhee	Dusky Flycatcher
Vesper Sparrow		House Wren
		Mountain Bluebird
		Rock Wren
		White-crowned Sparrow
		Western Meadowlark

*P < 0.05

USGS





Western Juniper

Pinyon - Juniper

Utah Juniper

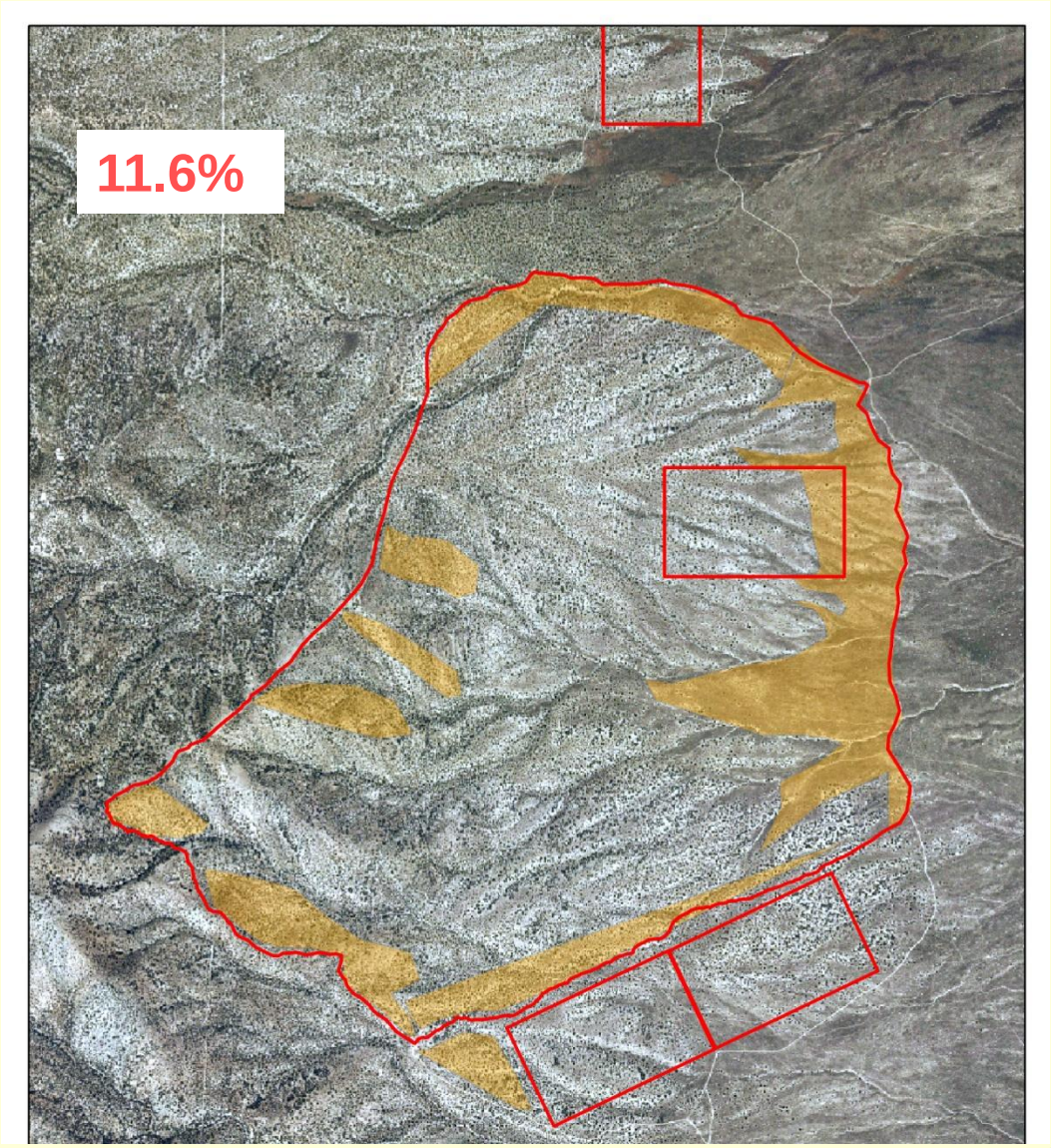
Onaqui

- Burned in Fall 2006
  - Pre-treatment data in 2006
- 5500-6200 ft elevation
- Utah Juniper, Wyoming big sagebrush, black sagebrush, bluebunch wheatgrass, Sandberg bluegrass, Indian ricegrass, cheatgrass, and various native wildflowers
- 65% of veg points associated with PC's burned
- 44.7% of area within burn plots was actually burned

USGS

Onaqui

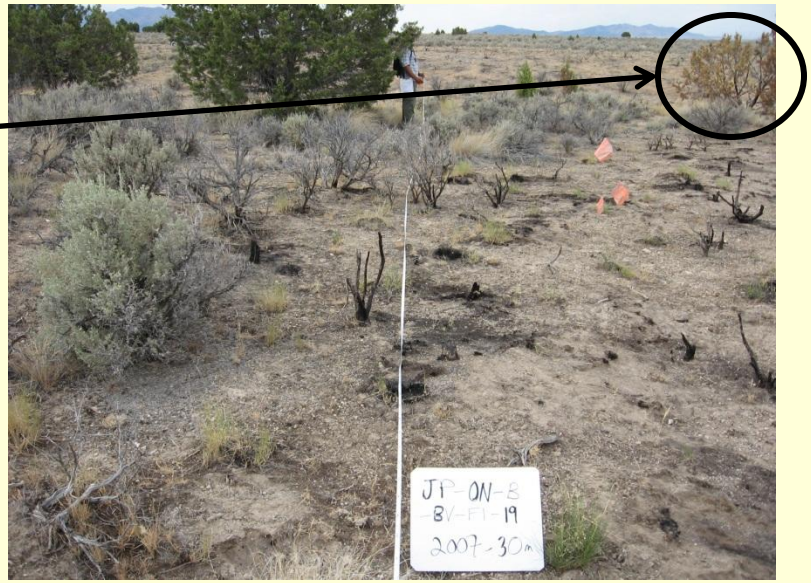
Approximate burn delineation



USGS

Onaqui

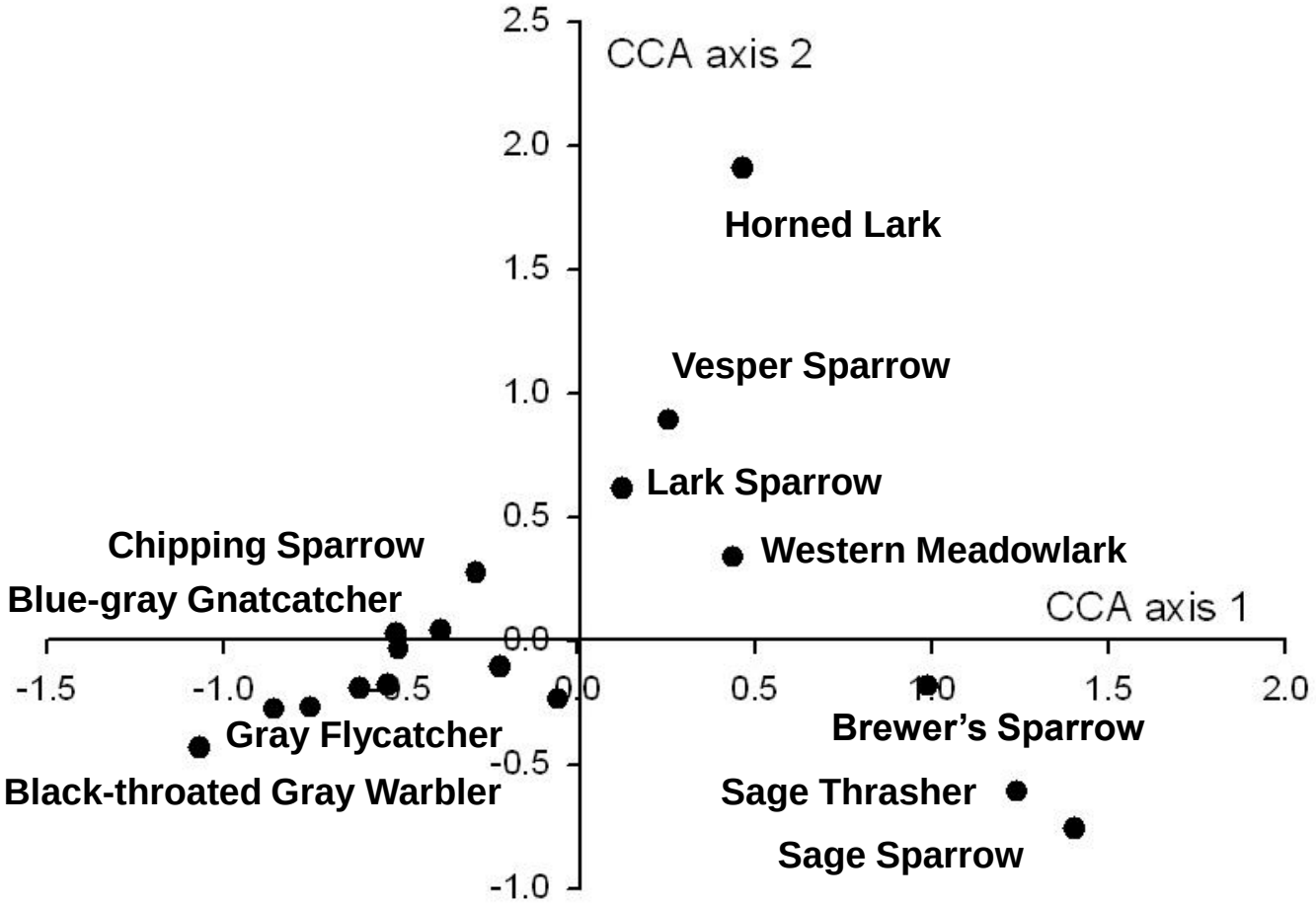
2006



2007

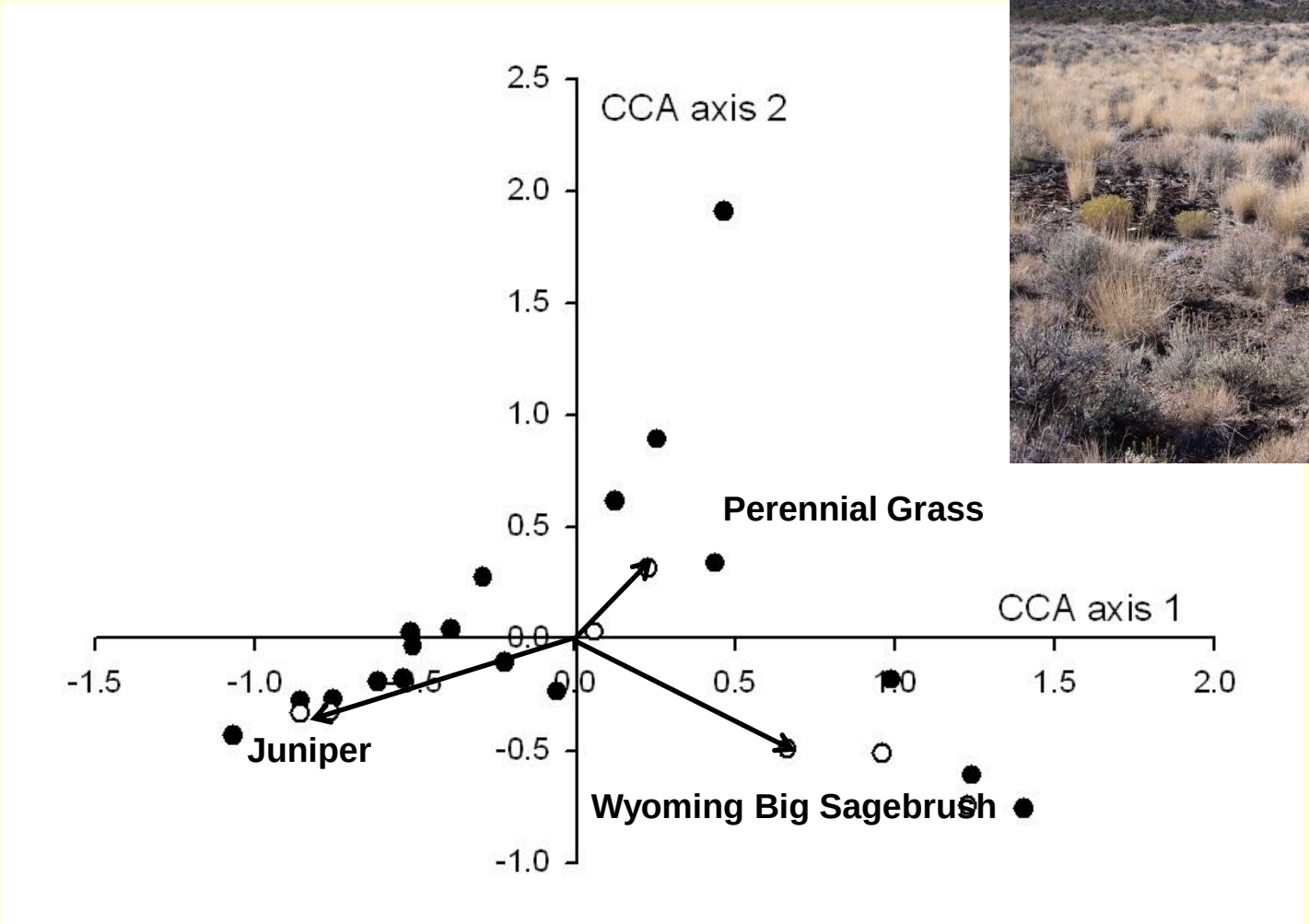
USGS

Onaqui


CCA axis 2
CCA axis 1
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
Horned Lark
Vesper Sparrow
Lark Sparrow
Western Meadowlark
Chipping Sparrow
Blue-gray Gnatcatcher
Gray Flycatcher
Black-throated Gray Warbler
Brewer's Sparrow
Sage Thrasher
Sage Sparrow

USGS

Onaqui


CCA axis 2
CCA axis 1
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-1.0
0.0
0.5
1.0
1.5
2.0
Perennial Grass
Juniper
Wyoming Big Sagebrush

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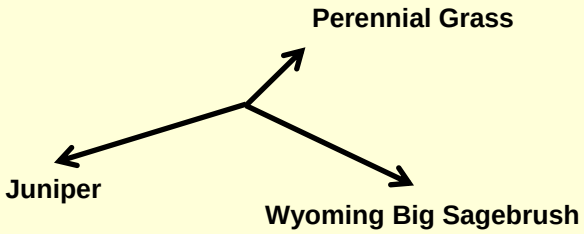
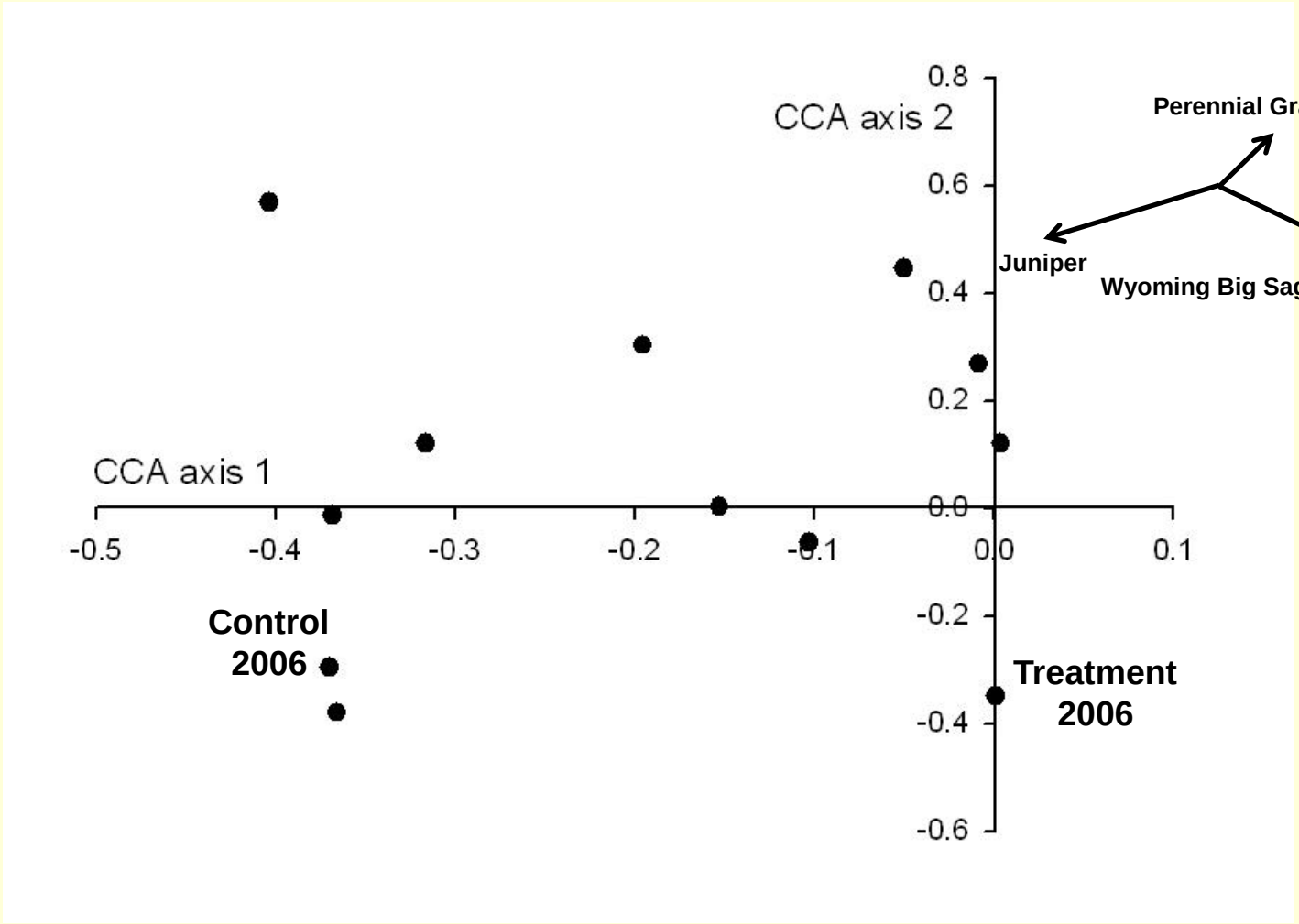


USGS

Onaqui


CCA axis 2
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
CCA axis 1
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
Perennial Grass
Juniper
Wyoming Big Sagebrush
Control
2006
Treatment
2006

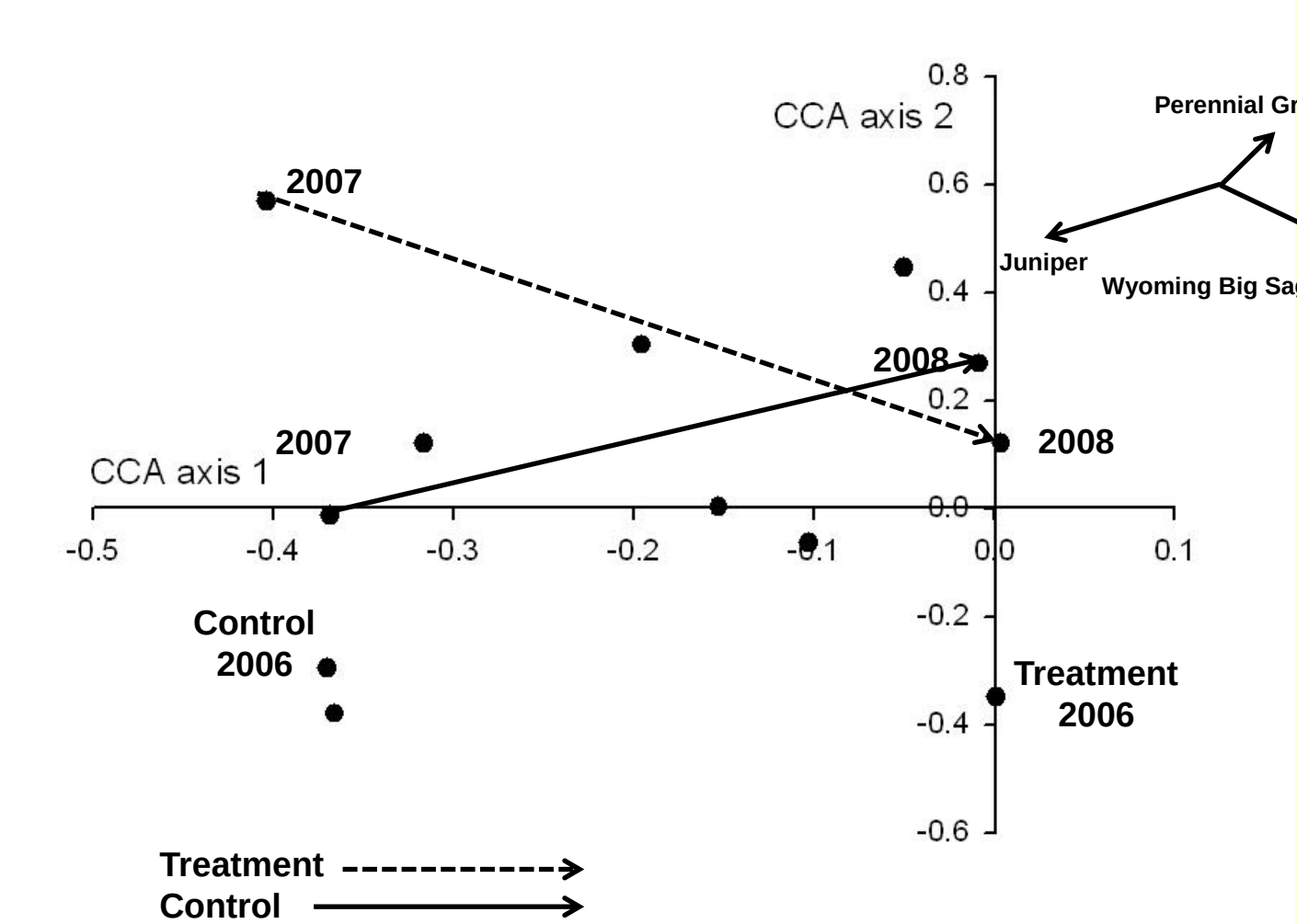
USGS

Onaqui

CCA axis 2
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
Perennial Grass
Juniper
Wyoming Big Sagebrush
2007
2007
CCA axis 1
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
Control
2006
Treatment
2006
Treatment
Control

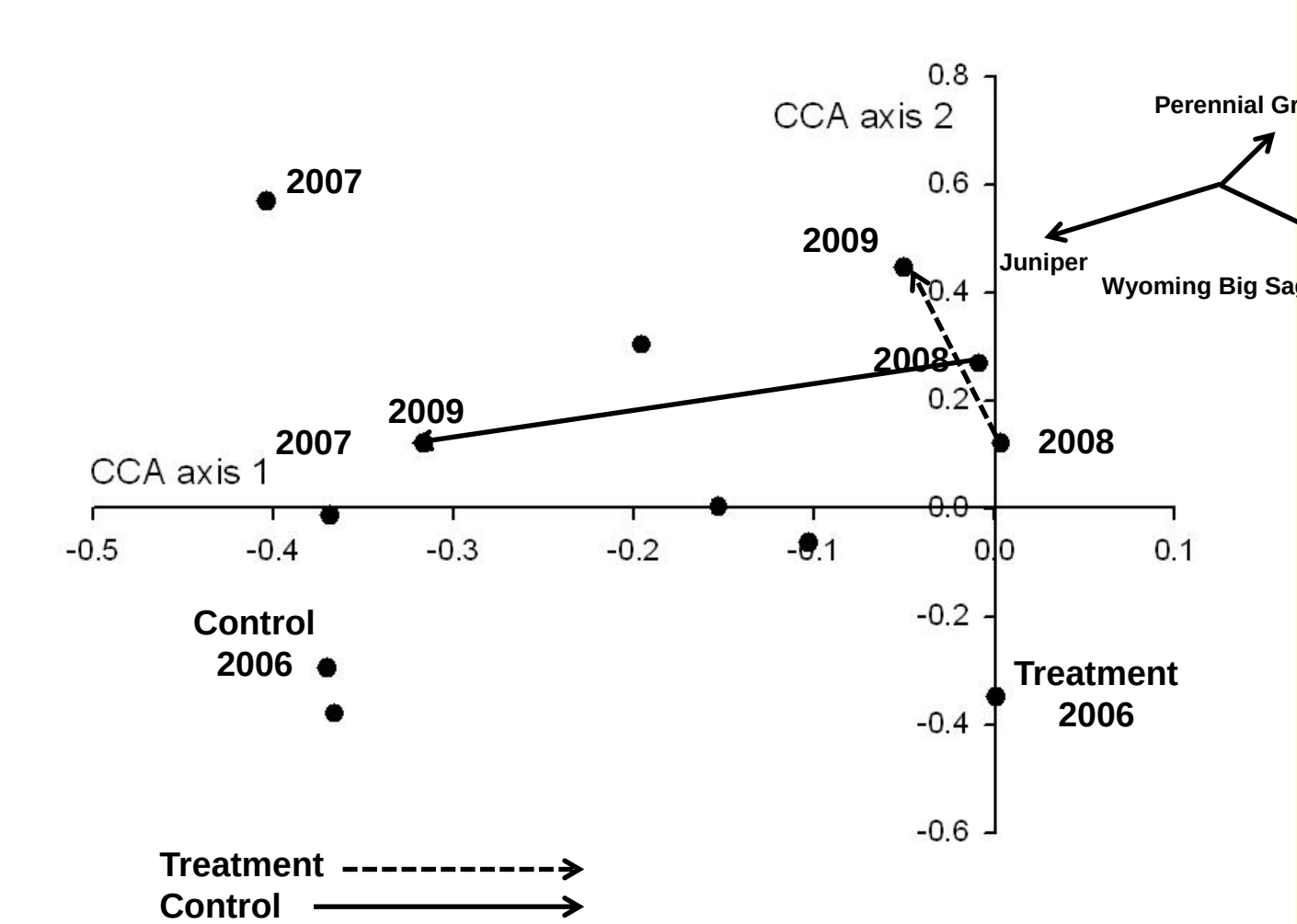
USGS

Onaqui


CCA axis 2
CCA axis 1
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
2007
2008
2007
2008
Perennial Grass
Juniper
Wyoming Big Sagebrush
Control
2006
Treatment
2006
Treatment
Control

USGS

Onaqui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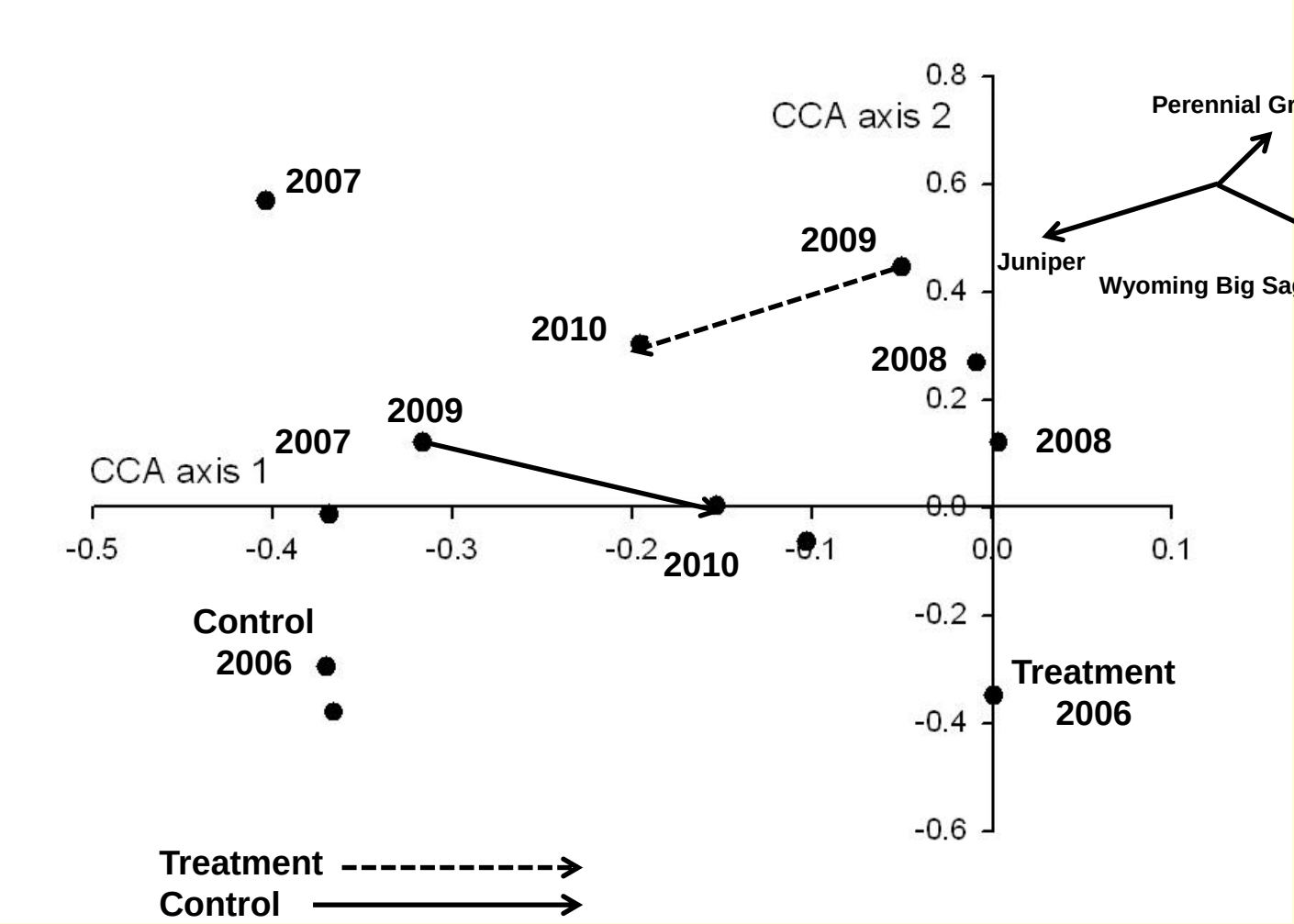
CCA axis 1
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
Perennial Grass
Juniper
Wyoming Big Sagebrush
2007
2009
2008
2009
2007
2008
Control
2006
Treatment
2006
Treatment
Control

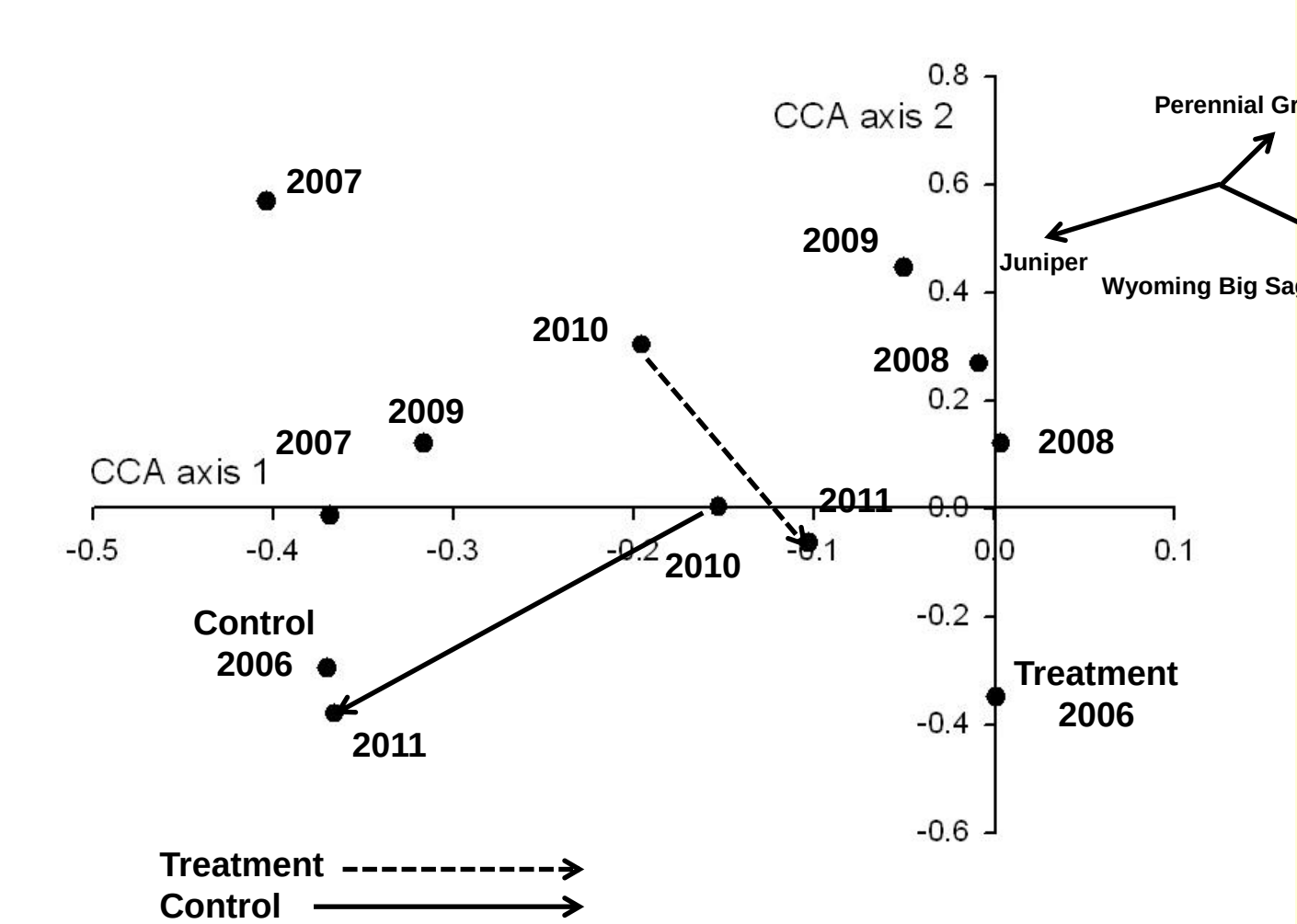
USGS

Onaqui


CCA axis 2
CCA axis 1
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
Perennial Grass
Juniper
Wyoming Big Sagebrush
2007
2009
2010
2008
2009
2007
2008
2010
Control
2006
Treatment
2006
Treatment
Control

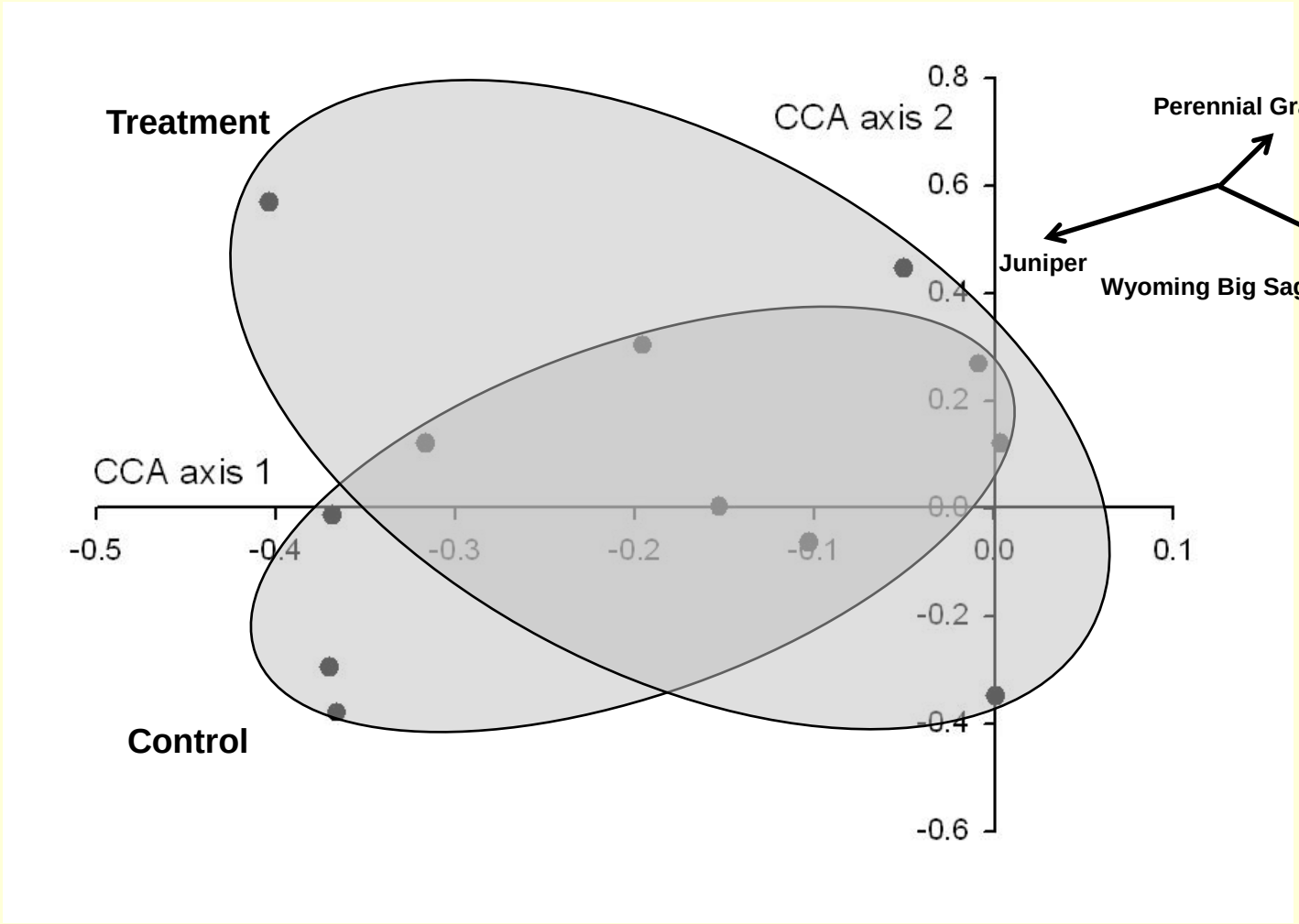
USGS

Onaqui

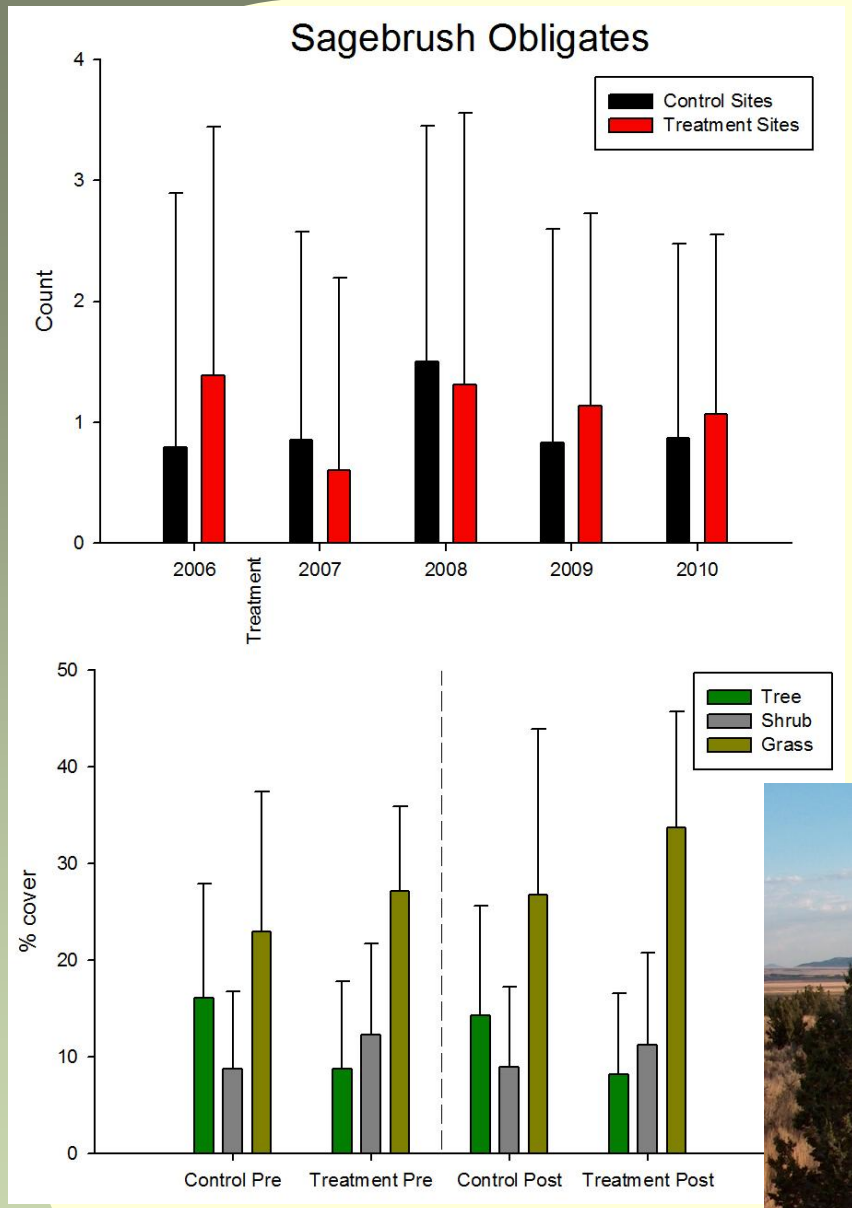

CCA axis 2
CCA axis 1
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
Perennial Grass
Juniper
Wyoming Big Sagebrush
2007
2009
2010
2008
2007
2009
2008
2011
2010
Control
2006
Treatment
2006
2011
Treatment
Control

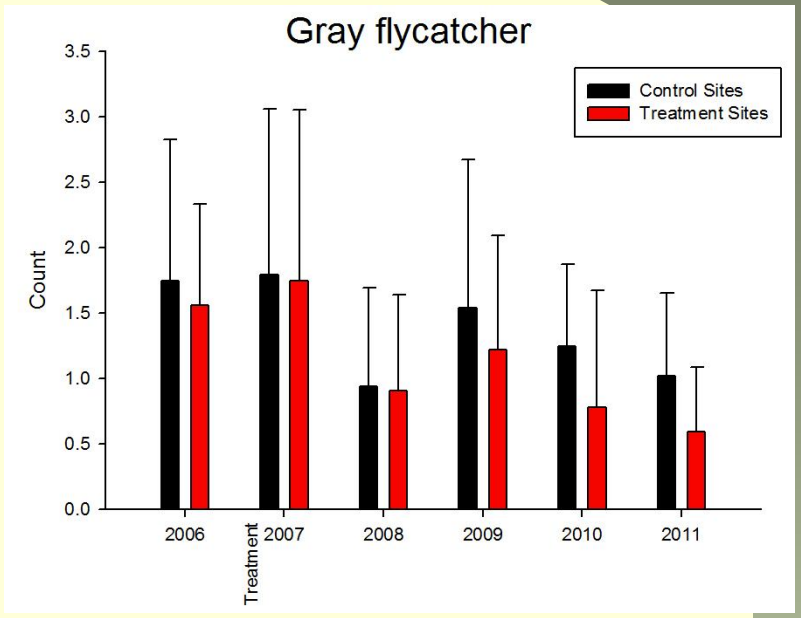
USGS

Onaqui


Treatment
Control
CCA axis 2
CCA axis 1
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
Perennial Grass
Juniper
Wyoming Big Sagebrush

USGS


Sagebrush Obligates
Control Sites
Treatment Sites
Count
0
1
2
3
4
2006
2007
2008
2009
2010
Treatment
Tree
Shrub
Grass
% cover
0
10
20
30
40
50
Control Pre
Treatment Pre
Control Post
Treatment Post


Gray flycatcher
Control Sites
Treatment Sites
Count
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2006
2007
2008
2009
2010
2011
Treatment

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Bird Response

- Species richness remained the same

Winners*	Losers*	No Change
	Bewick's Wren	Brewer's Sparrow
	Gray Flycatcher	Blue-gray Gnatcatcher
	Lark Sparrow	Spotted Towhee
	Horned Lark	House Finch
		Chipping Sparrow
		Juniper Titmouse
		Black-throated Gray Warbler
		Sage Sparrow
		Sage Thrasher
		Western Meadowlark

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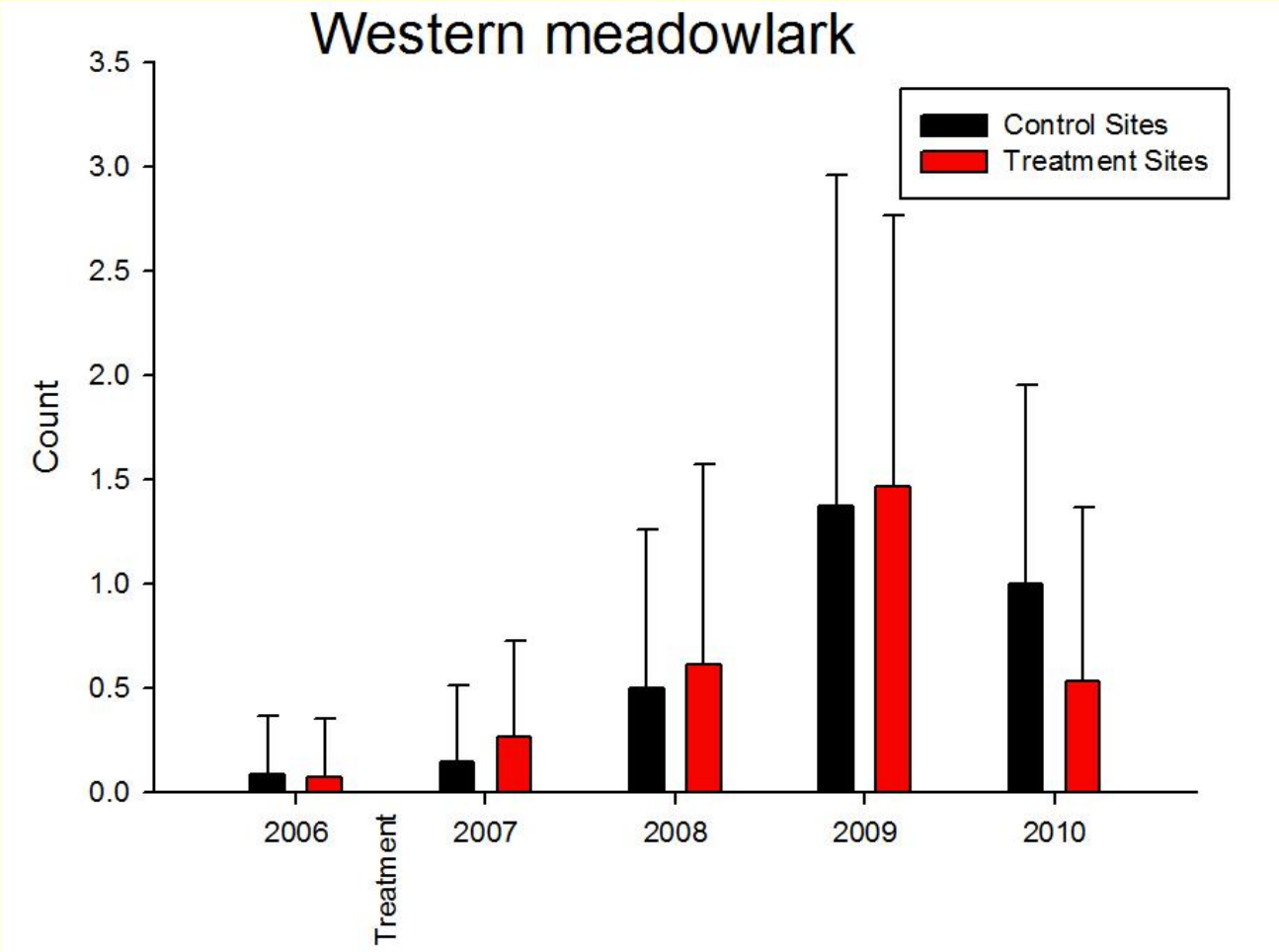
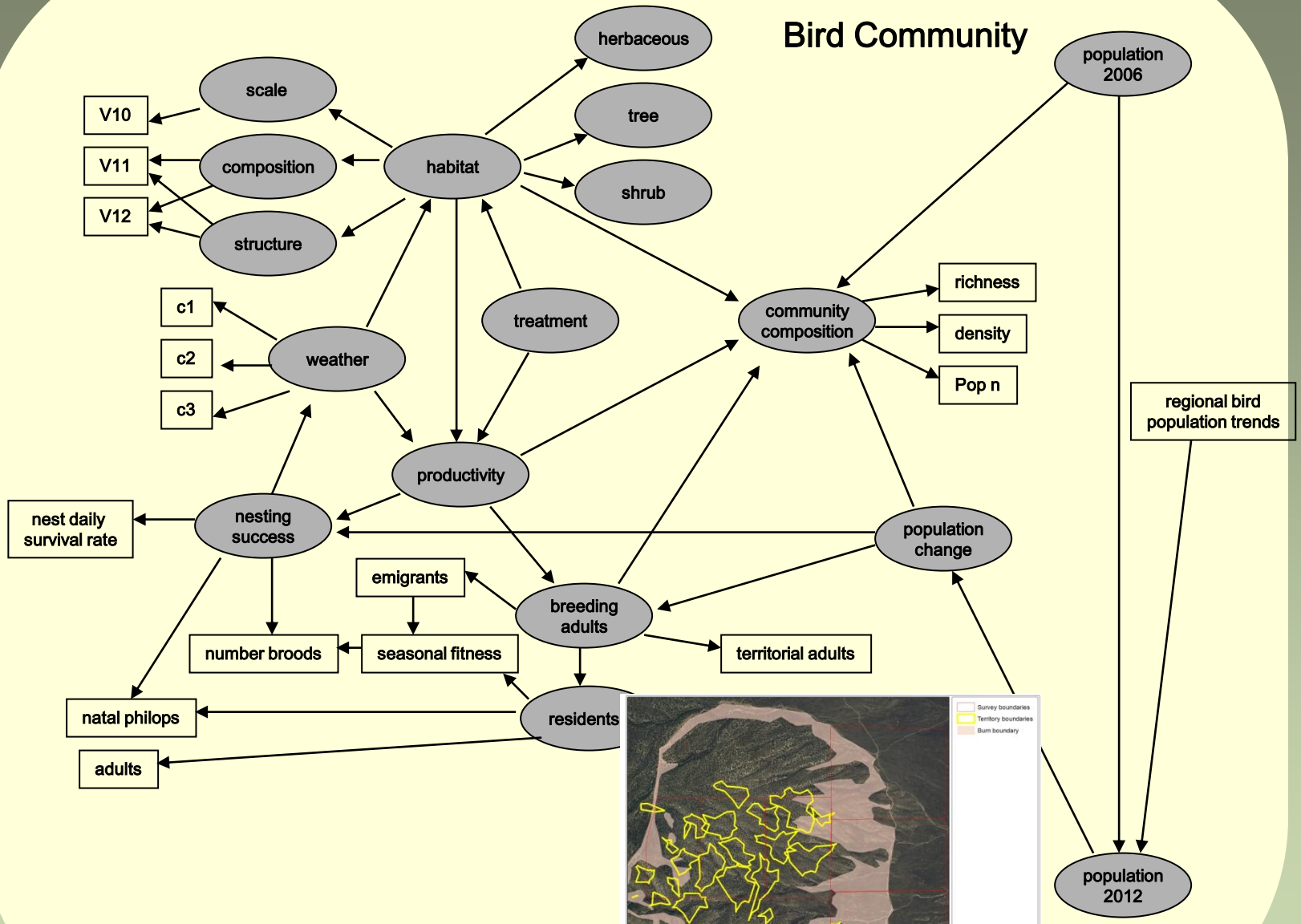
*P < 0.05


Western meadowlark
Control Sites
Treatment Sites
Count
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2006
2007
2008
2009
2010
Treatment

USGS

Bird Community



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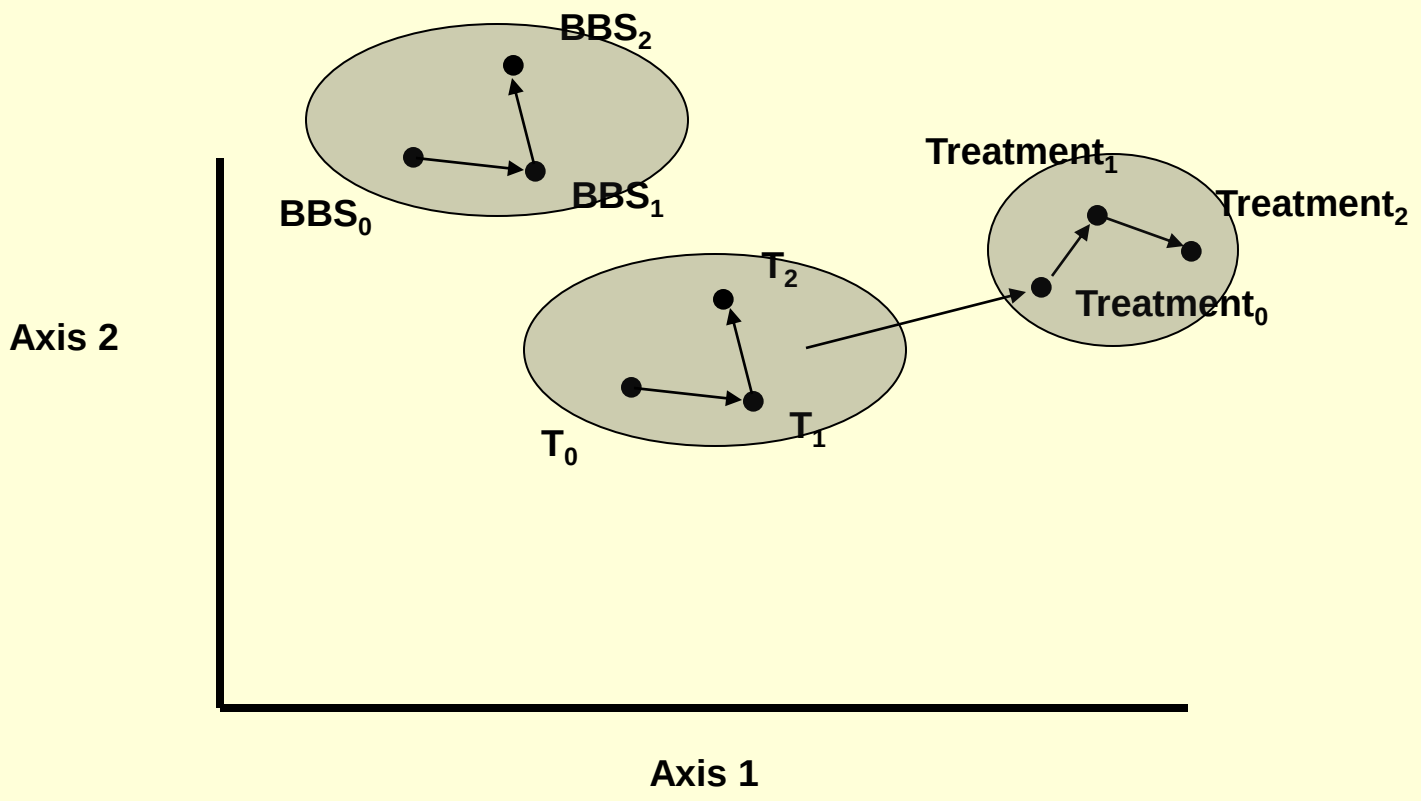
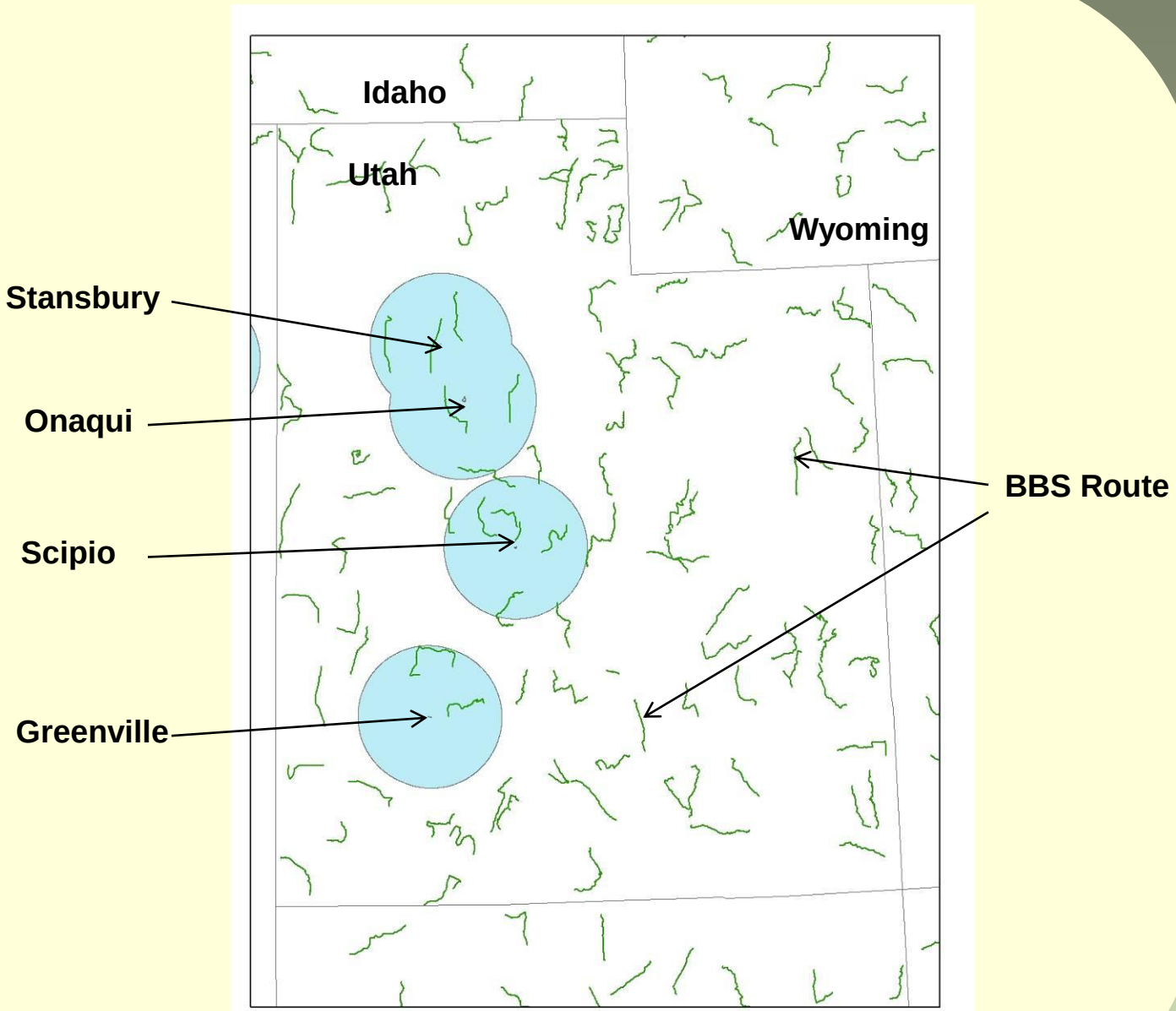
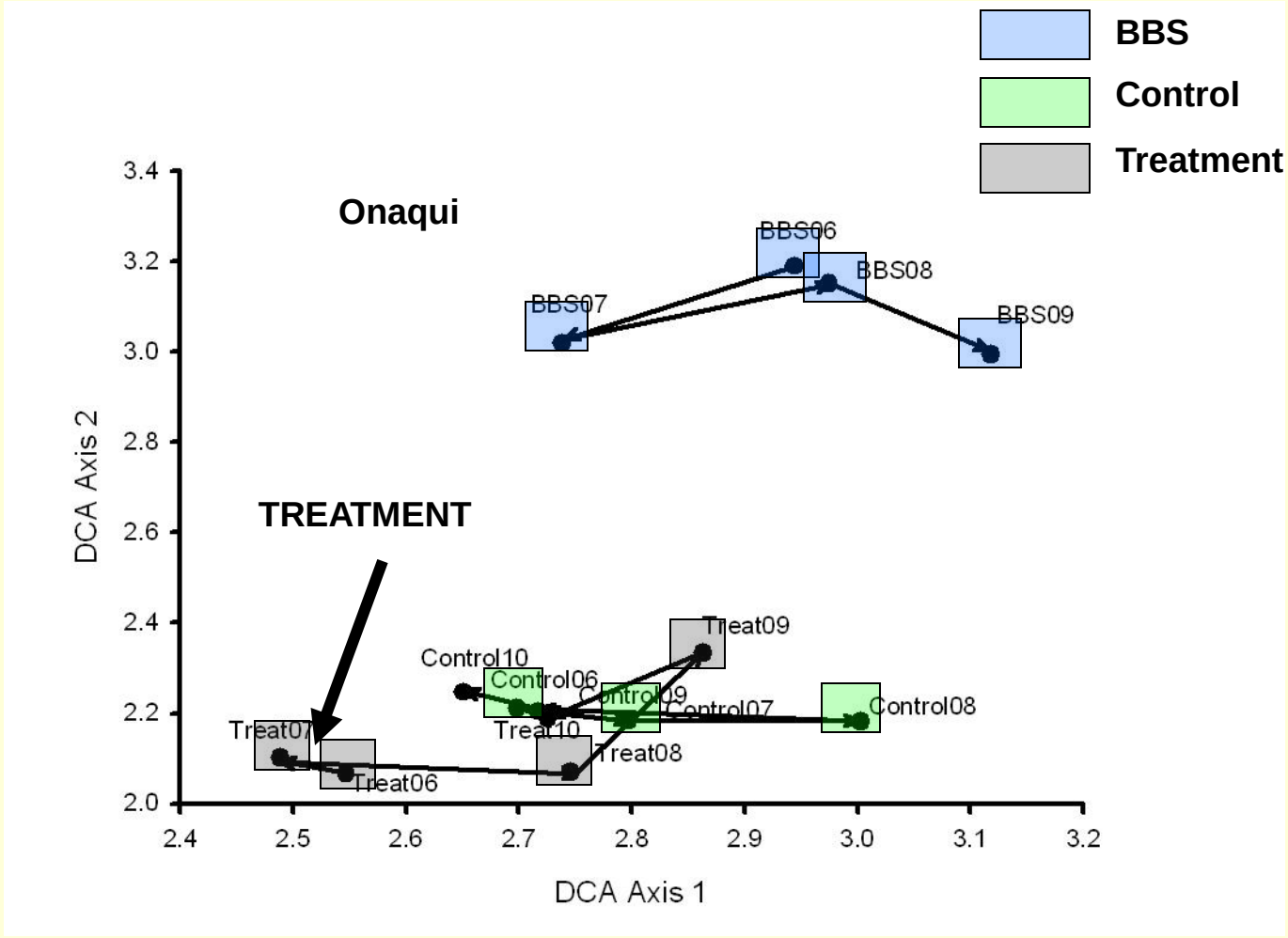

BBS2
BBS0
BBS1
Treatment1
Treatment2
Treatment0
T2
T0
T1
Axis 2
Axis 1


Idaho
Utah
Wyoming
Stansbury
Onaqui
Scipio
Greenville
BBS Route

USGS


BBS
Control
Treatment
Onaqui
TREATMENT
BBS06
BBS08
BBS07
BBS09
Treat09
Control10
Control06
Control09
Control07
Control08
Treat07
Treat10
Treat08
Treat06
DCA Axis 2
DCA Axis 1
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
2.4
2.5
2.6
2.7
2.8
2.9
3.0
3.1
3.2

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Correlations – Axis 1

	BBS	Control
Control	0.69 $p<0.01$	
Treatment	ns	ns

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Conclusions

- Treatment and control differ in bird community structure and trajectory
- Short-term response to treatment may be primarily a function of habitat loss
- Habitat improvements for sagebrush obligates may be long-term
- Regional dynamics also are important

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Acknowledgements

- Joint Fire Science Program
- SageSTEP project
- US Geological Survey
- Bureau of Land Management and US Forest Service for logistical support
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courtesy Jeff Rose

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